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# COAL AGE

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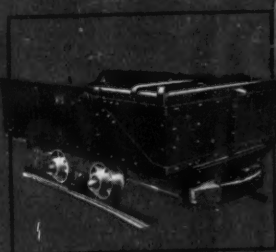
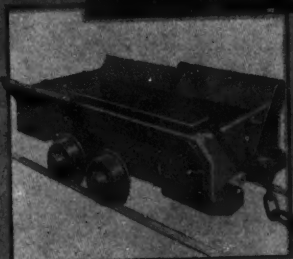
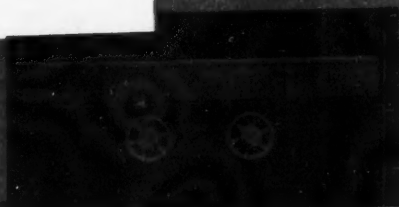
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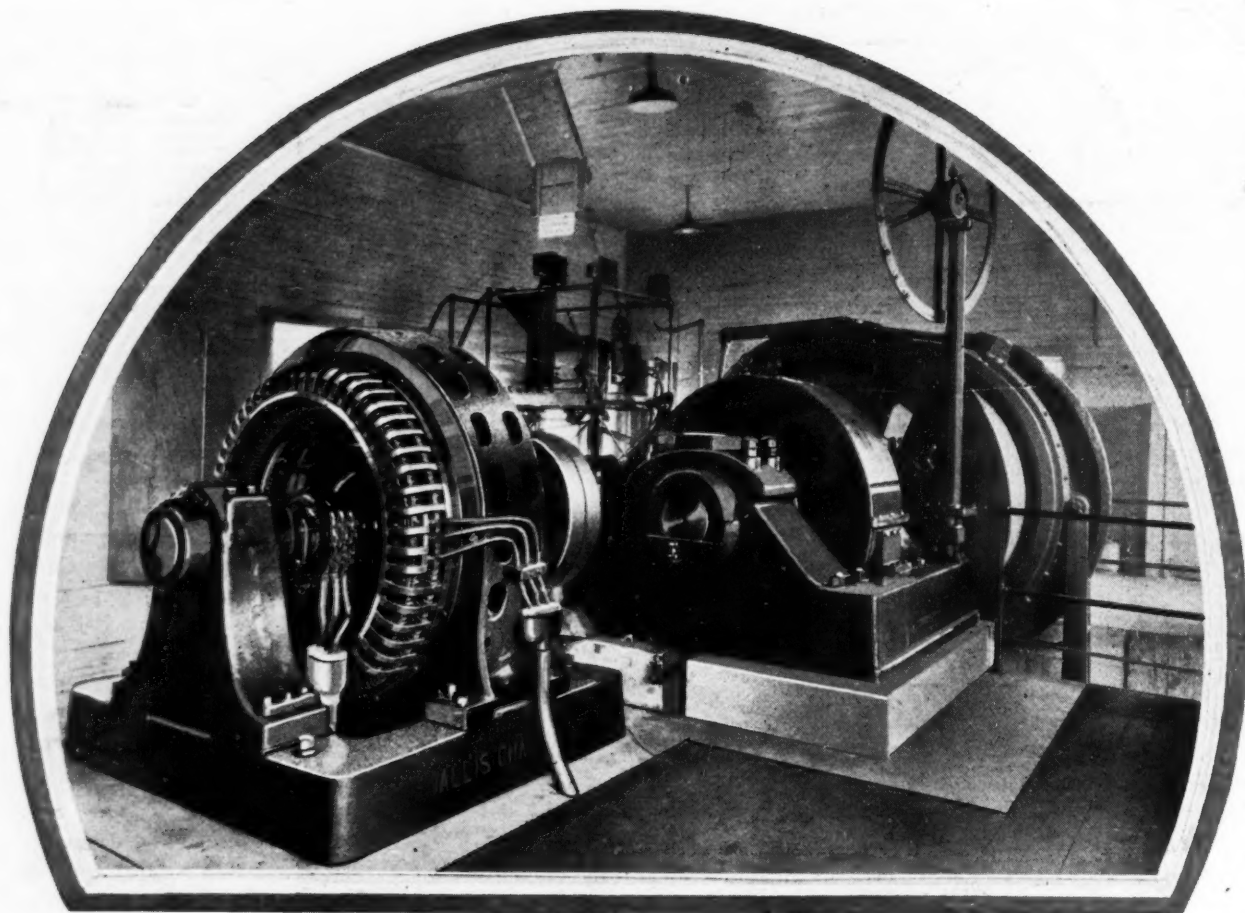
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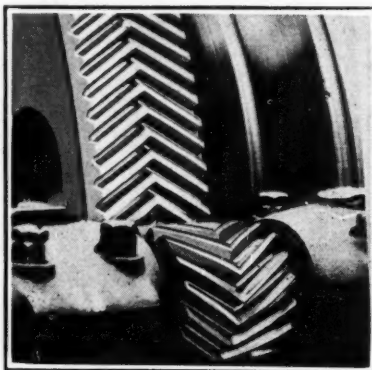


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## Another Kind of Derby

CHEAP FUEL is the goal toward which coal operators are today striving—cheap and good. Like many another worthwhile goal, however, it cannot be attained by any one means or by any single piece of equipment or process. In the vast majority of cases it can be reached only by an evolution or a growth tending constantly in one certain direction.

Coal operators everywhere are constantly on the alert for the successful methods or ideas of others that can be adapted to their own particular needs. It is this careful adaptation of the successful methods of others that has placed American coal production on the pinnacle of efficiency that it now occupies, and it is this spirit that is destined to accomplish even greater results in the future than it has yielded in the past—in the further mechanization of the mines, in freeing the workman from the drudgery of coal-getting and in making light, heat and power, as well as a thousand and one other things cheaper and more available to everybody.

Next week *Coal Age* will carry an article by A. F. Brosky describing some of the many ingenious arrangements and contrivances that both speed up and cheapen the operations of the Derby mine of the Stonega Coke & Coal Co., lying near the border line between Virginia and Kentucky. Although perhaps by no means all of the successful schemes employed at this operation are suited to adoption by other coal producers, yet all will nevertheless be interested in them. After all, the successful coal mine is made up of a multiplicity of separate schemes, processes and operations, each one of which either may or may not be applicable under different circumstances.

# Reflections of the Repair Shop Foreman



**"M**AYBE fellows that keep store can afford to buy cheap tools."

"They don't have to use them. They can always sell them at some kind of a profit."

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# COAL AGE

McGraw-Hill

PUBLISHING COMPANY, INC.

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Devoted to the Operating, Technical and Business  
Problems of the Coal-Mining Industry

R. DAWSON HALL  
*Engineering Editor*

Volume 30

NEW YORK, DECEMBER 30, 1926

Number 27

## An Old Story?

IT IS CONCEIVABLE that the oft-repeated admonition to modernize has become a bit monotonous to the average mine operator. Both editorially and otherwise, *Coal Age* has been preaching the doctrine for years. But, because this advice has been disregarded by many mine owners, and also because a mine to be kept modern requires frequent modifications and replacements, this periodical will continue to tell the "old, old story" to its readers.

A few minutes' reflection will convince any mine operator that a constant study of the many improvements in mine equipment and operation, an open mind and a liberal hand are the bases on which all modernization rests. And these conditions must obtain at all times if he is to write his financial accomplishments in large, black figures instead of in red ink or barely "over the line." To a continued driving home of the advantages, if not the necessity, of modernization *Coal Age* is firmly dedicated.

## Labor Saving and Economy

MODERN WASHING METHODS make for economy in labor but, if that is all, then a revolution in coal washing will take place only slowly, for even in the worst of installations a washer handles a large quantity of coal per man.

Whether one man can wash a hundred tons or a thousand is, it is true, an important consideration, but far more important is it how much he breaks up the coal in so doing and how much good coal he puts on the dump in the process. Suppose the breaker wastes 3 per cent of the product, and coal on the cars is worth \$5 a ton, then on 4,000 tons it wastes 120 tons, or \$600 which in 300 days equals \$180,000. If the washer breaks down one per cent less coal from an \$8 value to \$2 it has saved 40 tons from being depreciated by \$240 which for 300 days is a saving of \$72,000 or \$252,000 in all. If the breaker reduces the number of attendants from 40 to 4, reckoning the wage at \$5 it has saved only \$180 daily or \$54,000 in the year. That is a sizable saving, however, and brings the figure to \$306,000. There is also a possible power saving that added to this might serve to erect or remodel a new plant of smaller dimensions but equal capacity with the former and give a more equal product and one that should never require retreatment.

If a plant can be built which will save its cost in a year, it would be ill considered to go on year by year suffering a loss. The only reasons for not starting on the biggest possible program of reconstruction of old washers in the anthracite region is the fact that such reconstruction in some cases will, till completed, reduce the capacity and so limit income and will more than tax the powers of the company's construction engineers.

However, with a degree of standardization and more

complete reconstruction, it might be possible for some of the large companies to approximate mass production in their construction of breakers. At the end of the program it would be an advantage to them to be truly standardized, even if some of their ancient and inefficient machinery had to be scrapped. If the industry is to be efficient it must learn that obsolescent machinery is not equipment that won't work or needs much repair but often fine-looking machinery with promise of long but uneconomic, inefficient life. American progress has been rapid because the American has dared to look the facts of obsolescence squarely in the face and to buy equipment when the economy of its use will pay a profit. Obsolescence is a more significant word today than depreciation, and success will come only to those who learn to think in terms of the first rather than of the second.

## The Danger of the Air

ABOUT THIS TIME of year the mine ventilating current begins to represent not only the general safety of the mine but a hazard as well. Paradoxical as this may seem, it is nevertheless true, for whenever the outside temperature sinks below that of the mine, the fan virtually becomes a pump, daily abstracting large quantities of water from the underground workings. And whereas an ordinary pump can handle water only in its liquid state and consequently can remove it only from dips, swags or sumps, the fan can withdraw it with equal facility not alone from these places, but from roof, floor, ribs and timbers.

The reason that a fan becomes a pump in cold weather is not difficult to understand. Air, regardless of its temperature, has the power of holding water vapor but the amount held depends upon the temperature. The warmer the air the more water will it hold. When atmospheric air is cooled below its saturation point precipitation—rain or snow—results. Conversely when saturated air is warmed it ceases to be saturated, for at the higher temperature it is capable of holding more water, and promptly proceeds to pick up any moisture with which it may come in contact. It is this drying effect that the mine owner or operator has to contend with during the winter months.

Without going into detailed calculations it may be stated that an air current of 200,000 cu.ft. per minute entering the mine in a saturated condition at 0 deg. F. and leaving it in a saturated condition at 52 deg. F. will absorb and remove somewhat over 200,000 lb. or 100 tons of moisture in the course of a 24-hr. day.

In the light of this figure it is not surprising that the winter and early spring are the seasons when mine explosions are most frequent and violent. For this reason the winter should be the time when the mine management should look with particular care to sprinkling and rock dusting as well as to the efficient

condition of all rock-dust barriers. As is well known, wet coal dust cannot explode for the obvious reason that it cannot be thrown into suspension in the air. Damp coal dust is not liable to explode because it can be thrown into suspension only with difficulty. But when inflammable dust has been thoroughly dried and robbed of any moisture that it may have contained it reaches the condition of maximum danger.

The law of Nature cannot be reversed, and the ventilating current prevented from withdrawing moisture from the mine. But inasmuch as this law is known, the intake current can be humidified and the coal at the face of rooms and other working places can be sprinkled and thoroughly wet down immediately after shooting. Furthermore the dust on headings and haulageways may be mixed with rock dust and its potency for evil thus emasculated. The rockdust barriers at the entrance of the various sections may be inspected and their efficiency assured, so that if an explosion should occur and by any mischance get past these first lines of defense it will inevitably meet its Waterloo at the first barrier, and be thus effectively prevented from spreading to other parts of the workings.

### From Within or Without?

**M**OST EMPLOYERS lay great stress on the value and necessity of the fidelity of their subordinates. Loyalty to his superiors and to the company that employs him, continued enthusiasm for his work, and sincerity of purpose are generally considered as desirable and essential qualities in a man as a profound knowledge of the duties of his position. For, say the majority of executives, the qualities just enumerated are imperative to the success of their enterprises, and they will tell you that in measuring a man's value the extent to which he possesses these characteristics is seriously considered. But, like so many other truths that are beautiful in fact as well as in fancy, this one is often neglected and, in many instances, by the very men who stress its importance. Such neglect may be unwitting but none the less disastrous.

Many men have given their best years, profoundest loyalty, unbounded enthusiasm and sincere efforts to the company that employs them; have mastered not only the details of their own position but those of the man or men ahead; and have visioned the day when, through re-organization or the resignation or death of some executive, they would be advanced to positions of greater responsibility and authority. Through some cause a vacancy occurs in their organization and what then? Other things being equal, will the man or men who have prepared themselves for advancement receive what is justly theirs or, as frequently occurs, will an "outsider" be called in to fill the vacancy? In the first event, the benefits that accrue to the employer and the employees are many and important. Such a course means a strengthening of the loyalty, enthusiasm, trust and confidence not only of the particular individuals affected but of the entire organization which, through such action, can visualize the opportunities open to each one of them. More and better work will be accomplished because all of the employees from the highest to the lowest feel that the "Old Man" has a personal interest in them and they will do their best if for no other reason than to create a favorable impression. In businesses and organizations where such recognition is given to

faithful employees, labor turnover is generally very low and efficiency, and therefore profits, correspondingly high.

But how different the results when a vacancy is filled, apparently without reason, by the appointment of one outside the company. Enthusiasm lags, effort is reduced, vision practically ceases and the desire to learn and to master the various details of their own work and that of others with whom they are associated is lessened. Loyalty to employer and company is weakened if not entirely lost, grumblings are heard and dissatisfaction is everywhere apparent. In short, the morale of the entire organization is impaired and an attitude of "anything to get by" is plainly evidenced. Under such conditions it is not surprising that stability of employment is almost unknown and that many of the most capable employees sever their connections to accept positions that offer definite opportunity for advancement. Efficiency of operation is necessarily curtailed and financial returns are apt to be lower than the magnitude of the business actually transacted might logically appear to warrant.

If you would have the loyalty, confidence, trust and respect of your employees, adopt the policy of promotion from the rank and file whenever that course is at all possible. And, in so doing, you may be surprised and gratified to note the all-around improvement in your business, for what apparently affects but one man in a company usually has an effect on the entire body of the employees.

### "Smoke Eaters" vs. Smoke Eaters

**T**HE SMOKE EATERS Association has for its object "the study and discussion of mine fires and mine explosions with a view of their prevention and control, and the standardization of methods in fighting mine fires, opening fire areas, conducting rescue and recovery operations following mine explosions, with a view of surrounding those employed with all possible safeguards." But this association of "smoke eaters" shut off from itself a most valuable, and certainly a most worthy set of men when in the following language it confined its membership to: "Those who have had actual experience in wearing mine rescue apparatus or gas masks, in recovery work at mine fires or mine explosions shall be eligible for membership in this Association."

Certainly by such a limitation in membership they bar from their fold the real smoke eater. For, if a breathing apparatus does not leak the wearer "eats" no smoke. But there were men who, before the advent of the breathing apparatus and, even into the early days of its development risked their lives for the lives and preservation of property of others in explosions and mine fires with no protection. Even in the early days of the development of oxygen breathing apparatus and rescue cars these men effected many rescues and saved many lives hours before the arrival of the rescue car with its scientifically constructed apparatus and thoroughly trained crew.

Certainly the fool who today would rush into a mine after a disaster without protection should have no place in the new association, but it should if possible make adequate provision for appreciation of those who were real smoke eaters.



# Purchased Vs. Generated Current in Large Mines

Two Mines of Approximately the Same Capacity but Using Different Hoisting Methods Compared—Most Mines Can Utilize Refuse Of No Value as Fuel—Reliability of Operation Favors the Private Plant

By C. M. Garland  
Consulting Engineer, Chicago, Ill.

**A** QUESTION much discussed by coal operators is that of the relative advantages, both operating and economic, of purchased versus generated current for deep shaft coal mines. A comparison of the operating results of the New Orient mine, of the Chicago, Wilmington & Franklin Coal Co., which was published in a recent issue of *Coal Age* with those secured at the new Nason mine of the Illinois Coal Corp. at Nason, Ill., briefly set forth in the following pages, shed much light upon this vexed question so far at least as southern Illinois is concerned.

The New Orient mine was designed and constructed for the production of approximately 12,000 tons of coal per working day of 8 hr. This output is hoisted through one shaft by a skip handling approximately 11 tons of coal per trip. The Nason mine on the other hand was designed to hoist 12,000 tons in 8 hr. through two shafts located approximately 900 ft. apart. The coal is hoisted in cages and the cars contain approximately 5 tons of coal each. The total lift in the case of New Orient is about 600 ft., whereas that at Nason is approximately 825 ft.

The power equipment installed for the New Orient mine, according to the article referred to, comprises one main hoist equipped with two direct-current

motors, each having a capacity of 2,000 hp. These machines are furnished with current from a motor generator set of the fly-wheel type, operated by a 2,200-hp.

induction motor driving two generators. In addition to the main hoist, an auxiliary hoist for the man-and-material shaft is driven by a 400-hp. induction motor. A 200-hp. motor and a steam engine are provided for emergency operation. A heating plant consisting of two 150-hp. return tubular boilers is also provided.

The power plant for the Nason mine consists of one 28x48-in. twin hoisting engine for operating one of the shafts. Ultimately a second engine of the same size will be installed to drive the hoist at the second shaft. These machines will be furnished steam from four 460-hp. boilers, three of which are now in place. Exhaust steam from the hoisting engines is led to low-pressure regenerators that store up heat during operating cycles and deliver it to mixed-pressure turbines. At the present time one 1,000-kw. mixed-pressure and one 500-kw. high-pressure turbine are in operation with provision for the installation of a second 1,000-kw. mixed-pressure turbine when the second hoisting engine is started.

The exhaust steam from the hoisting engines is more than sufficient to gen-

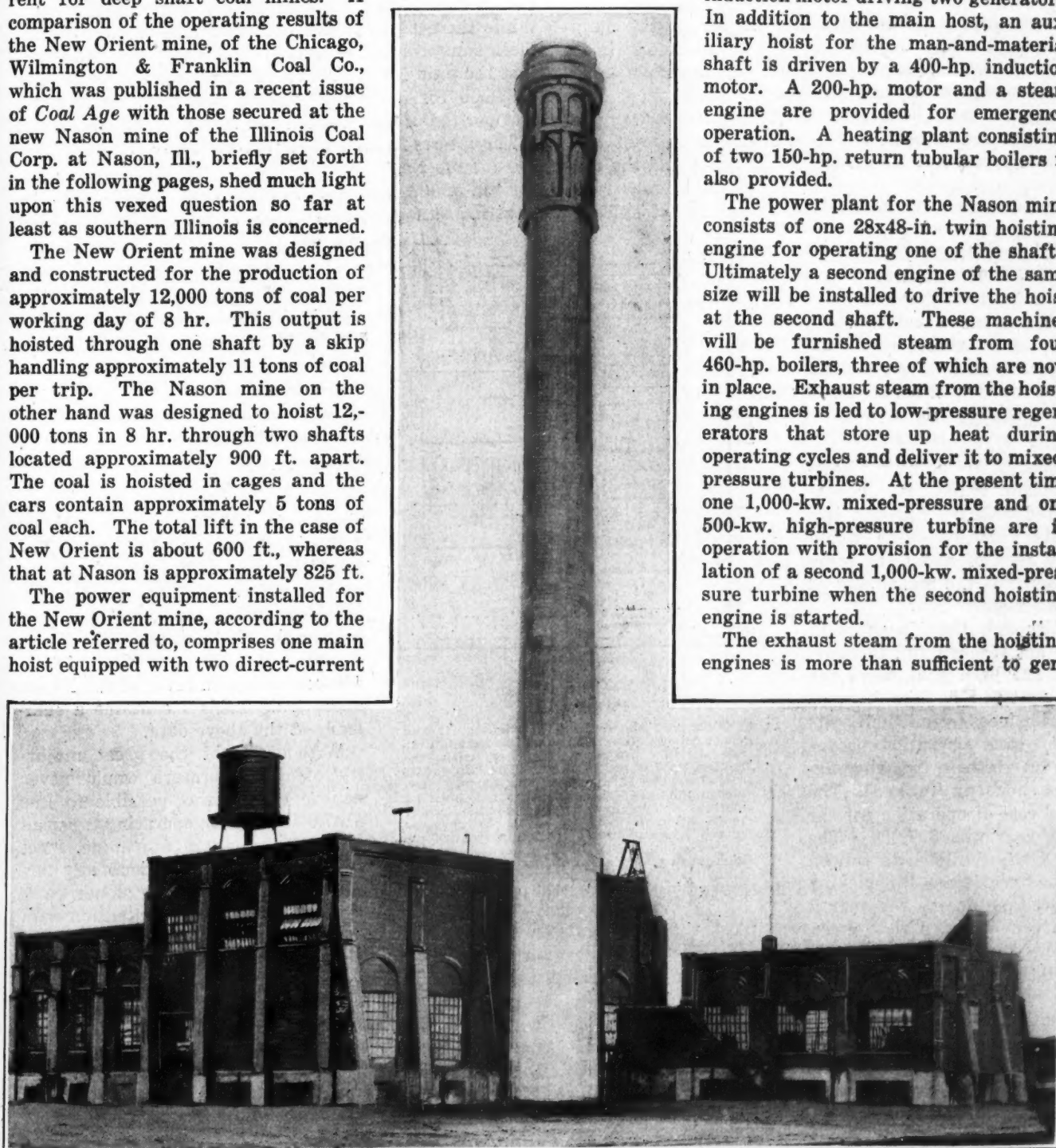


Fig. 1—Power Plant and Hoist House at Nason

This plant of the Illinois Coal Corp. done by steam and the exhaust is sent through mixed pressure turbines which generate all current necessary for cutting and haulage purposes. Interest and depreciation on the equipment installed are about equal to the "readiness to serve" charge of a public utility. Reliability favors the private plant.

erate all the current for cutting and haulage in and about the mine. Throughout the winter months a portion of this exhaust steam during the working period is turned into the heating system for warming the buildings, and another portion goes to a large storage heater than warms sufficient water during the working period to supply the wash house at the end of the day.

The total cost of this equipment to date, which is sufficient to operate one shaft, is approximately \$400,000. An additional \$150,000 will bring the plant up to its ultimate capacity of approximately 12,000 tons of coal per day. The total ultimate investment in power and hoisting equipment will, therefore, approach \$550,000.

No figures have been given for the cost of the equipment for the New Orient mine, but a tentative estimate would indicate that the first cost for the main hoist, the auxiliary hoist, and the heating plant, must have been in the neighborhood of \$375,000. If, however, the Nason mine had been developed along the lines of New Orient, because of its greater shaft depth and the consequent higher power demand due to the higher rates of acceleration, the investment for electrical hoisting

From the data given on pages 364 and 365 of *Coal Age* for Sept. 9, 1926, the power bill for the New Orient mine for the month of March, 1926, would be \$14,159, of which \$5,375 would be the readiness to serve charge, and \$8,784, the energy charge less the 10 per cent discount. From these figures it is obvious that if the mine were producing 2,000,000 tons of coal per annum, the cost of current would approximate \$170,000.

In order to place the cost on the same basis with that for the Nason mine, the salaries of the engineers for operating the main and auxiliary hoists, and those of the firemen employed in the heating plant must be included, together with repairs and maintenance charges, and probably also the coal burned under the boilers. While these figures have not been published, obviously their sum will not be less than \$27,000 per annum so that the total for the New Orient mine is approximately \$197,000 for operating expense per year, making the cost per ton of coal hoisted and delivered on cars, 9.85c.

The interest and depreciation at 10 per cent on \$550,000 for the Nason mine is \$55,000 per annum, or 2.75c. per ton of coal hoisted. For the New Orient mine the total investment is taken as \$375,000 so that the fixed

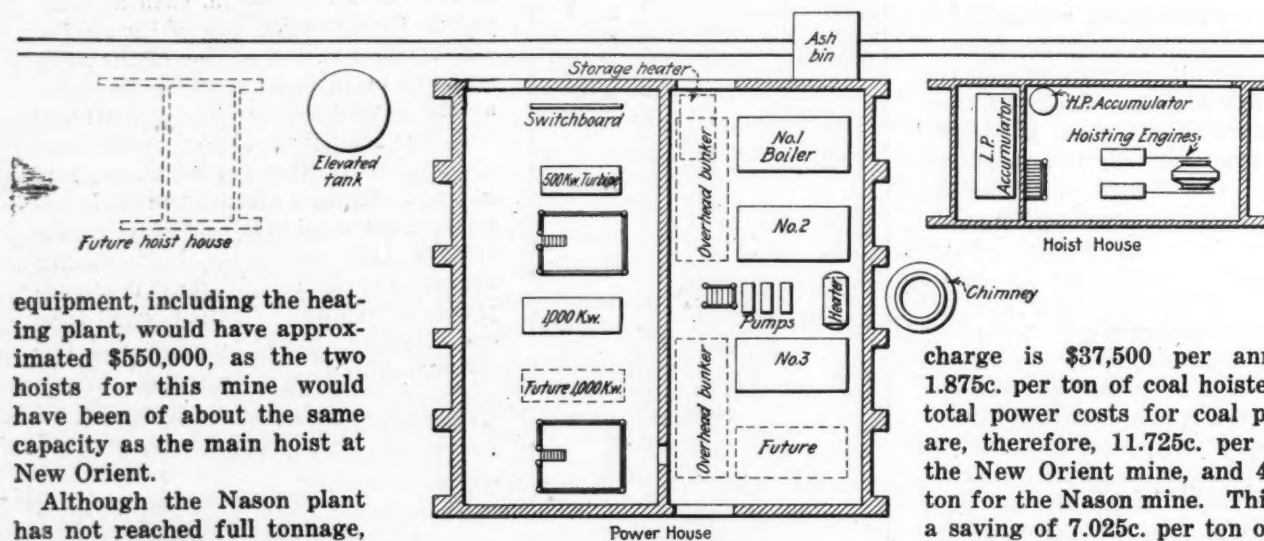


Fig. 2—General Plan of Power Plant

This plant is of modern brick, steel and glass construction. Three of the four boilers are already installed together with the heater, pumps and bunkers. The two shafts are about 900 ft. apart yet the distance that steam must be transmitted to the hoisting engines is much less because the power plant is located between them. The present mixed pressure turbine utilizing steam from the exhaust of the hoist generates enough current to do all cutting and haulage. Exhaust from the second hoist will be utilized in an exactly similar manner.

equipment, including the heating plant, would have approximated \$550,000, as the two hoists for this mine would have been of about the same capacity as the main hoist at New Orient.

Although the Nason plant has not reached full tonnage, and has been shut down for the past few months, because of business conditions, its first year's operation proves the correctness of the figures shown in Table II. The total cost of operation for the first year was \$27,000. The plant was designed to run on refuse coal from the picking tables, and during the year it was demonstrated that there was more than sufficient of this fuel to operate the plant, so that the fuel bill is negligible. As a matter of fact, it was cheaper to send this refuse to the boiler room than to the gob pile.

Inasmuch as there was no coal bill, the operating costs on the plant remain almost stationary without regard to load. Any increase in load when the plant has reached its full capacity will only increase the quantity of oil, waste, and repairs, the labor bill remaining essentially the same. If it is, therefore, assumed that the plant delivers 2,000,000 tons of coal per annum, the total operating expense for power will be approximately \$39,010, as stated, in Table II and the cost per ton of coal hoisted and loaded onto cars will be 1.95c.

charge is \$37,500 per annum or 1.875c. per ton of coal hoisted. The total power costs for coal produced are, therefore, 11.725c. per ton for the New Orient mine, and 4.7c. per ton for the Nason mine. This shows a saving of 7.025c. per ton or \$140,500 per annum in favor of the Nason operation. Table I contains a summary of the above data.

Without doubt the great majority of coal operators would never believe that it was possible to lose \$157,990 a year in operating expenses on power alone in any mine. Yet these figures are undoubtedly accurate within at least 10 per cent, and clearly prove my contention with

my clients maintained for many years, that a public utility cannot possibly compete with a properly designed power plant in average mines of from 2,000 tons daily capacity upward. This is because of two basic facts which are invariably obscured by a mass of irrelevant detail when the operator comes to consider matters of this kind.

First, in the great majority of mines, a refuse coal which cannot be sold can be used for fuel.

Second, although the first cost per unit of capacity of power equipment installed in the small plant of the coal operator is greater than that per unit of capacity of generating equipment installed in the central station, yet this latter cost plus that of transmission lines, trans-



formers, etc., is usually about the same as the unit cost of the operator's small plant. This means that the readiness-to-serve charge of the utility is always about equal to, or a little greater than, the interest and depreciation on the first cost of the operator's plant, taken at 10 per cent per annum.

Table I—Summary of Data

	New Orient Mine	Nason Mine
Daily capacity, tons.....	12,000	12,000
Coal hoisted per trip, pounds.....	22,000	10,000
Hoisting cycle, seconds.....	26	24
Total hoist in feet.....	about 600	825
Annual operating expense.....	\$197,000	\$39,010
Annual operating expense per ton.....	9.85c	1.95c
Saving in operating expense per annum.....		\$157,990
First cost of installation.....	375,000	550,000
Fixed charges at 10 per cent.....	37,500	55,000
Annual cost of power.....	234,500	94,010
Cost per ton.....	11.725c	4.70c
Annual saving.....		\$140,500

In the above figures, the readiness-to-serve charge for the New Orient mine was \$5,375 for the month of March, 1926, or at the rate of \$64,500 per annum, while the interest and depreciation on the total cost of the Nason power equipment was only \$55,000. There is also a vast difference in dull seasons between paying out a readiness-to-serve charge of close to \$65,000 per annum, and charging off on the books \$55,000 yearly for interest and depreciation on the investment. In the case of the Nason plant, however, the maximum demand would have been larger, owing to the high duty of the hoisting cycle, so that in this case the readiness-to-serve charge had it been supplied with purchased current would undoubtedly have been near \$70,000 per year.

Table II—Operating Costs for the Nason Plant

4 Firemen..... @ \$2,650 per annum.....	\$10,600
1 Coal and ash man... @ 2,650 per annum.....	2,650
4 Engineers..... @ 2,900 per annum.....	11,600
1 Engineer..... @ 2,780 per annum.....	2,780
1 Engineer..... @ 2,690 per annum.....	2,690
1 Engineer's assistant @ 2,690 per annum.....	2,690
Total, labor.....	\$33,010
Repairs and supplies.....	6,000
Total operating cost.....	\$39,010

It should, therefore, be obvious to anyone that if there is no coal bill, and if the readiness-to-serve charge is greater than the interest and depreciation on the investment in the operator's plant, a public utility cannot compete with a properly designed isolated power station.

Many utilities have spent large sums of money in the coal fields to obtain the business of coal operators. In other words, they have gone after something which they were not entitled to, and it will not be surprising if some of them suffer losses on this business in the future. The coal-mining industry from the standpoint of pure economics is the least adapted to profit by central-station current, for as a rule, every pound of coal burned in a central station for supplying current to a coal mine is a pound of coal thrown away, for this current, in all probability, could have been generated from a waste product. Furthermore, insofar as the majority of coal operators is concerned, every pound of coal burned in a central station for generating current for a coal mine, is worse than a pound of coal thrown away, for it is a pound of coal bought from a competitor.

I have no disposition to "knock" the public-utility business. There are thousands upon thousands of plants

where public utilities perform a valuable economic service, but the coal-mine plant is, as a rule, not one of them.

It is furthermore not the purpose of this article to imply that the Chicago, Wilmington & Franklin Coal Co. has been misled into the building of the New Orient plant. This company is owned by a large organization whose principal occupation is the building and management of public utilities. It could, therefore, better assume this loss in operating expense than give the public-utility business in southern Illinois the black eye that an isolated plant in a mine of this prominence, operated by a public-utility organization, would inevitably have given it.

#### INDIVIDUAL PLANT IS MORE RELIABLE

One of the arguments advanced in support of purchased current is that it relieves the mine management of the troubles incident to the operation of a complete power installation. Though it may be granted that there is some less trouble, it is believed that the additional responsibility entailed in the operation of a complete power installation as compared to that of one using purchased-current is entirely offset by the greater reliability of the former. This is particularly true in a region where the mines are scattered and the transmission systems cover large territories. During practically every storm there is some interruption to service, and throughout the winter months when continuity of current supply is most important these interruptions are most frequent.

#### INTERRUPTIONS MUCH LESS FREQUENT

A number of years ago, the Nokomis Coal Co. upon my recommendation built its own power plant. One of the greatest arguments advanced by the public utilities against the installation of this plant was a lack of reliability. In three years of operation only one interruption to service occurred and this lasted for only 30 min. Prior to the installation of this plant, when energy was purchased, an interruption to the public service supply amounting to 30 min. or more occurred almost weekly. It was not unusual during the winter months for the current to go off the lines in the morning and remain off throughout the entire day.

While conditions at the present time may be somewhat better, it is a safe prediction that the loss of time through failure of the power supply for the New Orient mine will be ten times as great during a year as that sustained from the same cause at the Nason mine.

### This Country Now Uses Much More Current Than Formerly

According to a report of the U. S. Geological Survey, the quantity of electricity produced in the United States in 1925 was 11.5 per cent more than in the previous year, although the amount of coal consumed was only 7 per cent greater than in 1924. The gas used in generating this energy was 4 per cent, and the quantity of oil 38 per cent less, than in the previous year.

The gain in efficiency of generation resulted in a saving of  $\frac{1}{10}$  lb. of coal per kilowatt-hour, or a saving of 2,000,000 tons of coal during 1925. It is also stated in the report that an average of 3.2 lb. of coal was required to produce a kilowatt-hour of electricity in 1919, and that this average was reduced in 1925 to 2.1 lb.

# Effect of Coal Dust on the Gases Resulting From Detonating Permissible Explosives\*

Coal Dust in Drillholes Will Not Appreciably Increase Noxious Gases Liberated by Detonation of Normal Shots—A Blownout Shot, Under the Same Conditions, May Have Disastrous Consequences

By J. E. Crawshaw and G. W. Jones

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AS THE CONFINEMENT of an explosive is increased there is a decrease in the carbon monoxide and hydrogen, an increase in the methane and virtually no change in the carbon dioxide, in the resultant gases. It is well known also that the "oxygen balance" of an explosive has an important bearing on the gases resulting from detonation, and that the quantity of poisonous and combustible gases increases as oxygen deficiency increases.

The oxygen balance of an explosive, when used in coal mining, may be easily changed. The drillhole usually

missible explosives, both when the shot performs its normal work and when a blowout shot occurs.

The investigation of that part of the problem treating of the effect of coal dust under normal conditions resolves itself into the question: "Does the coal and coal dust act as an unmixed ingredient of the explosive? And, since coal is composed chiefly of carbon and hydrogen, does it augment any oxygen deficiency of the explosive and thereby increase the quantity of poisonous and combustible gases liberated by the explosive on detonation?"

Inasmuch as the experimental apparatus used in the following tests was designed with a view to such investigations, it can readily be applied to the study of the above conditions, each of which may be encountered in actual mining practice. Only slight modification in the test procedure is necessary to simulate each condition. It is believed that this apparatus, and the methods of making the tests, sufficiently approximates actual conditions to permit of the practical application of the experimental results.

When an explosive performs its normal work the gases which are liberated on detonation expand and cool to

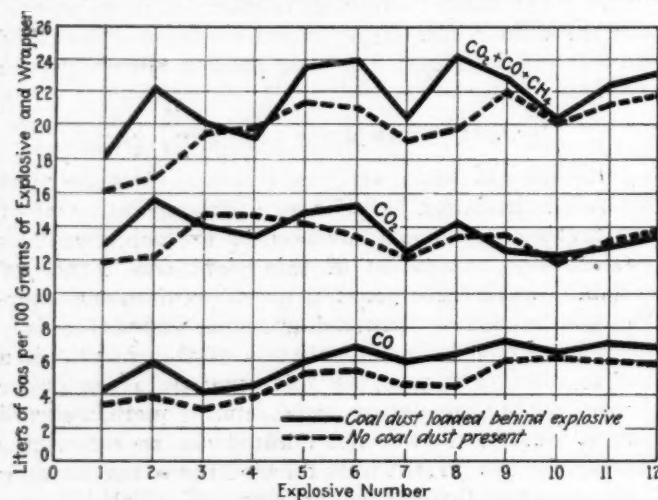


Fig. 1—Coal Dust Does Not Appreciably Increase Noxious Gases Produced by a Normal Shot

When an explosive performs its normal amount of work the presence of coal dust in the drillhole has but little effect on the gases produced by the detonation. The carbon monoxide, carbon dioxide and total carbon-bearing gases evolved by various permissible explosives when detonated under the conditions of Test "A" have here been plotted. In this test the gases were discharged into an atmosphere of nitrogen to prevent after-burning.

has some coal dust, from the drilling, distributed along its length. A portion of this fine material may be pushed to the back of the hole during loading; part may be left along its length in intimate contact with the explosive; and some may be forced up in front of the explosive by the stemming. Where drillings or bug dust are used for stemming, the entire bore of the shot-hole in front of the explosive is filled with coal dust. The question naturally arises as to what effect the coal and coal dust may have on the gases resulting from per-

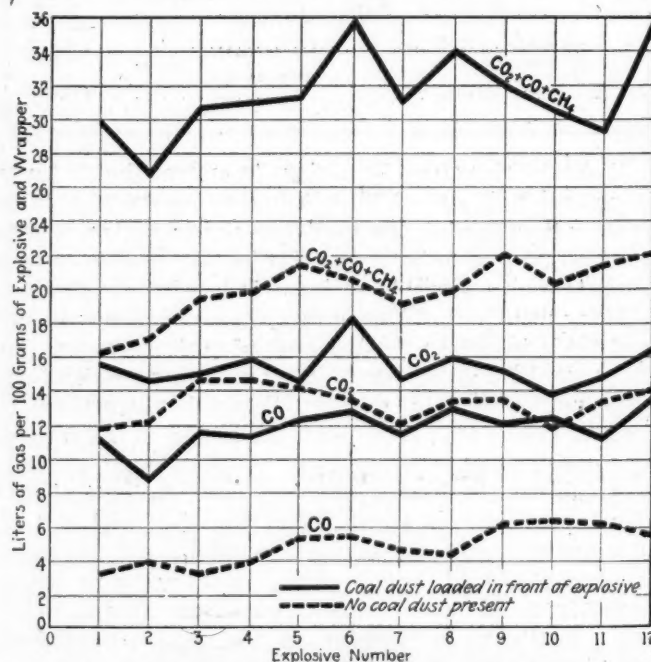


Fig. 2—An Ideally Hazardous Condition

These curves represent the quantities of carbon-bearing gases produced by different types of permissible explosives when subjected to Test "B." In this test, which simulates the conditions of a blownout shot, the coal dust is loaded in the borehole in front of the explosive and the resulting gases are discharged into air. The increase in the quantity of carbon monoxide and total carbonaceous gases produced under these conditions graphically illustrates the potential dangers of blownout shots.

\*Published with approval of Director, U. S. Bureau of Mines. This is the third of a series of articles by Messrs. Crawshaw and Jones dealing with their investigations on the gases resulting from the detonation of explosives under various conditions. The first article, "An Apparatus for Studying Gases of Explosives Detonated Under Confinement," appeared in *Engineering and Mining Journal-Press*, Vol. 120, 1925, pp. 965-967. The second, "Confining an Explosive Reduces Carbon Monoxide and Hydrogen Content of Resultant Gases," appeared in *Coal Age*, Vol. 30, 1926, pp. 383-385.



Table I—Analysis of Explosives Used in Tests, Per Cent

Sample No.	Moisture	Nitroglycerin and Nitropolyglycerin	Ammonium Nitrate	Sodium Nitrate	Ammonium Chloride	Sodium Chloride	Ant-Acid	Carbonaceous Combustible Material	Weight of Wrapper per 100 Grams of Explosive Ingredient, Grams	Oxygen Balance, Grams
1	0.56	9.78	73.88	1.26	....	7.60	0.76	6.16	7.7	-7.6
2	0.35	10.32	74.03	1.87	....	6.99	0.51	5.93	7.8	-7.8
3	0.68	9.85	73.73	6.63	1.18	....	0.96	6.97	8.5	-8.2
4	1.10	10.05	65.03	14.68	0.81	....	0.85	7.48	8.9	-8.4
5	0.90	8.81	63.05	15.13	1.55	....	0.74	9.82	8.8	-11.0
6	0.72	9.98	74.72	4.53	0.45	....	0.61	8.99	9.0	-13.8
7	0.92	8.72	70.37	....	....	10.22	0.91	8.86	9.0	-15.0
8	0.65	9.43	79.68	....	0.65	....	0.14	9.45	10.0	-16.0
9	1.10	9.47	77.49	....	0.86	....	0.77	10.31	9.4	-16.2
10	1.04	8.56	68.56	....	2.32	9.28	0.46	9.78	10.0	-18.1
11	0.56	9.68	69.47	....	....	10.29	0.19	9.81	10.4	-18.3
12	1.13	9.78	76.56	0.87	0.14	....	0.51	11.01	9.8	-19.0

such an extent, before coming in contact with the air, that reactions with the atmosphere outside the drillhole can be neglected. Accordingly, as most nearly simulating actual conditions, the following test procedure was adopted:

A. The explosive was packed tight in the borehole of the cannon, or until it attained a "density of 1." One hundred grams of coal "drillings" were then added and tamped against the explosive. A disc of asbestos paper, to hold the coal drillings in contact with the explosive charge, was next introduced. Lastly, 1 lb. of dry fire-clay stemming was added and tightly packed. The explosive was set off by an electric detonator and the gases discharged into an atmosphere of nitrogen.

B. To simulate the effect of a blownout shot with coal dust in front of the charge the only modification in the test from procedure A was to discharge the gases into an atmosphere of air.

The series of tests with procedure A showed only a slight reaction between the coal dust and the gases resulting from the detonation. Since these conditions should be more favorable for reaction than when the coal dust is behind the explosive, it was decided to run a series of tests with air in the discharge chamber so that there would be greater opportunity for reaction. The modification in the procedure from that of test B was to first introduce the coal drillings into the borehole and then the explosive and stemming.

To determine the extent to which the coal dust had entered into reaction in each of these series of tests, the gases obtained under each condition were compared with those secured under the same condition when no coal was present. The total quantity of carbon-bearing gases ( $\text{CO}_2$ ,  $\text{CO}$  and  $\text{CH}_4$ ) produced was used as the criterion of reaction, since these carbon-containing gases must result either from the carbonaceous material in the ingredients of the explosive or from the coal. Any increase in the total carbon of the gases above that originally in the explosive, is attributable to the coal.

The coal dust used in all of the tests was drill cuttings taken from the Pittsburgh bed. The proximate analysis of this coal was: Moisture, 2.7 per cent; volatile matter, 32.9; fixed carbon, 58.7, and ash, 5.7 per cent. The ultimate analysis was: Hydrogen, 5.2 per cent; carbon, 78; oxygen, 8.9; nitrogen, 1.4, and sulphur, 0.8 per cent.

A preliminary investigation of the effect of the size of coal dust showed that the resultant gases and the quantity of coal taking part in the reaction were practically the same for all sizes of dust from that passing a 10- and retained on a 20-mesh screen to all passing a 200-mesh screen. This was probably due to the action of the force of the explosion on the larger particles by which they were pulverized to the fine sizes which took part in the reaction. However, in order that all test conditions would be uniform the drill cuttings were crushed so that all the material could be passed through a 10-mesh screen.

In the investigation of each of the above conditions, 12 ammonium nitrate permissible explosives having a fairly wide range of oxygen deficiency were used. Table I, gives the composition of these explosives arranged in order of increasing oxygen deficiency.

Tables II, III, and IV give the results of three series of tests. In the first two tables there is given for purposes of comparison the gases which result under the same conditions of loading but when no coal dust is present. The gases evolved under these conditions are the same for Table IV as for Table III. Table II shows the results of the tests wherein the conditions of normal work were simulated. Table III sets forth the results secured under conditions that approximate blownout shots and Table IV the results when the coal is pushed to the back of the borehole. Figs. 1, 2 and 3 show graphically the amounts of  $\text{CO}_2$ ,  $\text{CO}$ , and total carbon-bearing gases given in Tables II, III and IV, respectively. The solid line illustrates the results obtained when coal dust was present and the broken one when it was absent.

Table II—Composition of Gases Discharged Into Nitrogen; Coal Dust in Front of Explosive

No Coal Dust Present							100 Grams Coal Dust Packed in Front of Explosives						
Gas at 0°C. and 760 mm. per 100 Grams of Explosive, Liters							Gas at 0°C. and 760 mm. per 100 Grams of Explosive, Liters						
Sample No.	CO						CO						
	$\text{CO}_2$	$\text{CO}$	$\text{H}_2$	$\text{CH}_4$	$\text{CO}_2 + \text{CO} + \text{CH}_4$	$\text{CO}_2$ Ratio	$\text{CO}_2$	$\text{CO}$	$\text{H}_2$	$\text{CH}_4$	$\text{CO}_2 + \text{CO} + \text{CH}_4$	$\text{CO}_2$ Ratio	
1	11.40	3.35	2.10	1.70	16.45	0.29	10.85	3.65	2.00	2.65	17.15	0.34	
2	11.60	3.20	2.30	1.95	16.75	0.28	10.55	4.70	1.70	3.65	18.90	0.44	
3	12.30	3.65	1.30	2.15	18.10	0.30	12.60	6.50	3.30	3.15	22.25	0.52	
4	12.70	4.25	2.80	2.25	19.20	0.33	12.05	6.20	3.95	2.90	21.15	0.52	
5	11.65	4.20	2.95	2.85	18.70	0.36	11.75	6.90	4.65	2.00	20.65	0.59	
6	12.70	5.75	4.30	1.75	20.20	0.45	13.10	7.80	5.25	3.25	24.15	0.60	
7	10.80	5.45	3.10	2.95	19.20	0.50	10.40	6.20	4.15	3.05	19.65	0.60	
8	11.30	6.25	3.50	1.75	19.30	0.55	11.40	6.25	3.50	1.75	19.30	0.55	
9	11.80	5.85	4.10	3.70	21.35	0.50	11.40	6.50	4.60	3.55	21.45	0.57	
10	10.00	5.00	3.10	3.35	18.35	0.50	10.50	6.45	3.40	3.75	20.70	0.61	
11	11.15	5.55	2.95	2.20	18.90	0.50	11.55	5.20	3.50	2.65	19.40	0.45	
12	11.90	5.55	3.05	2.95	20.40	0.47	12.35	5.50	3.20	3.65	21.50	0.44	

**Table III—Composition of Gases Discharged Into Air; Coal Dust in Front of Explosive**

(Twelve samples of permissible explosives fired in a cannon stemmed with one pound of stemming)								100 Grams Coal Dust Packed in Front of Explosive							
No Coal Dust Present								Gas at 0°C. and 760 mm. per 100 Grams of Explosive, Liters							
Sample No.	CO <sub>2</sub>	CO	H <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> +CO+CH <sub>4</sub>	Oxygen Reacting Liters	CO <sub>2</sub> Ratio	CO <sub>2</sub>	CO	H <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> +CO+CH <sub>4</sub>	Oxygen Reacting Liters	CO <sub>2</sub> Ratio	CO
1	11.85	3.25	2.05	1.00	16.10	0.55	0.27	15.80	11.05	4.00	2.90	29.70	10.50	0.70	
2	12.10	3.90	2.30	0.95	16.95	3.15	0.32	14.70	8.75	3.50	3.25	26.70	7.65	0.60	
3	14.85	3.10	1.65	1.55	19.50	5.15	0.21	15.00	11.60	4.95	4.05	30.65	5.45	0.77	
4	14.75	3.80	1.65	1.25	19.80	4.05	0.26	15.95	12.20	4.95	3.80	30.95	7.10	0.70	
5	14.20	5.30	3.10	1.95	21.45	3.95	0.37	14.55	12.20	6.30	4.45	31.20	6.95	0.84	
6	13.50	5.40	4.10	1.65	20.55	1.85	0.40	18.55	12.95	6.35	4.25	35.75	8.15	0.70	
7	12.10	4.60	2.60	2.40	19.10	3.70	0.38	14.60	11.25	5.50	5.30	31.15	9.00	0.77	
8	13.40	4.50	2.65	1.90	19.80	3.05	0.34	15.95	13.30	6.65	4.75	34.00	7.10	0.83	
9	13.50	6.00	4.40	2.53	22.05	1.85	0.44	15.20	11.90	6.35	5.15	32.25	8.75	0.78	
10	11.80	6.35	2.75	2.15	20.30	3.20	0.54	13.75	12.15	4.75	4.75	30.65	7.35	0.88	
11	13.10	6.00	2.20	2.20	21.30	3.20	0.46	14.55	11.00	5.55	3.80	29.35	8.05	0.76	
12	13.75	5.45	2.75	2.70	21.90	3.70	0.40	16.10	13.20	5.50	5.95	35.25	8.20	0.82	

From the data obtained in the tests just described the following conclusions can be drawn:

1. When the hot combustible gases (CO, H<sub>2</sub>, and CH<sub>4</sub>), liberated by the detonation of an explosive, are discharged into air they react with the oxygen therein.

2. When coal dust is suspended in the air into which these hot gases are discharged, the reaction is much more pronounced. The data in Table III show that the extent to which the reaction will proceed is limited by the available oxygen. In nearly all of the present tests, the oxygen had been reduced to such a point that further reaction was impossible. On the average, 75 per cent of the available oxygen was consumed.

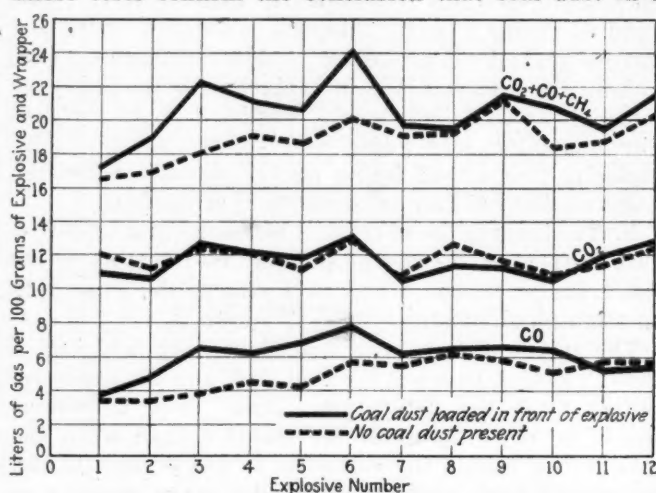
3. When coal dust is thrown into the air behind the hot gases from an explosive, no extensive reaction occurs.

4. The reaction in which the coal dust takes part is one between such dust and air. It is initiated by the reaction between the gases and air.

5. Coal dust reacts only to a slight extent with the ingredients of an explosive or with the gases resulting from its detonation.

To check the last conclusion under conditions more favorable for reaction between the coal dust and the ingredients of the explosive, a number of permissibles

methane, but more carbon dioxide, than when the explosive with its wrapper was detonated with no coal dust present. In both cases the gases were discharged into an atmosphere of nitrogen to prevent after-burning. These tests confirm the conclusion that coal dust in a

**Fig. 3—Carbonaceous Gases Formed in Test "C" When Discharged into Air**

In this series of tests the procedure was identical with that of Test "B" except that the coal dust was loaded behind the explosive—a condition often met with when charging drillholes that have not been thoroughly cleaned. It is interesting to compare the quantities of noxious gases evolved under this condition with those illustrated by Figs. 1 and 2 and to note the similarity of the curves shown in Figs. 1 and 3.

drillhole in the absence of air does not act, to any appreciable extent, as an unmixed ingredient of the explosive. Neither does it react readily with the gaseous products of detonation.

#### EFFECTS OF COAL DUST SUMMARIZED

When the above conclusions are applied to the conditions met with in actual mining, the effect of coal dust can be summarized as follows:

1. When a shot does the normal amount of work, coal dust in the drillhole will react only to a negligible extent and will not appreciably increase the volume of noxious gases evolved by the explosive.

2. When a blownout shot occurs, the coal dust in front of the explosive may be ignited by the flame from the hot combustible gases liberated on detonation. This may readily occur on contact with the air. As a result, a large quantity of poisonous gases may be produced or a coal dust explosion be initiated that may propagate over a large part of the mine.

Both these dangers can be guarded against by thoroughly cleaning the drillhole before loading, and by the use of sufficient non-combustible stemming.

**Table IV.—Analyses of Gases Discharged into Air; Coal Dust Behind Explosive**

(Twelve samples of permissible explosives fired in a cannon tamped with one pound of stemming)  
100 Grams Coal Dust Packed Behind Explosive  
Gas at 0°C. and 760 mm. per 100 Grams of Explosive, Liters

Sample No.	CO <sub>2</sub>	CO	H <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> +CO+CH <sub>4</sub>	Oxygen Reacting Liters	CO <sub>2</sub> Ratio
1	12.80	4.25	1.55	1.10	18.15	2.20	0.33
2	15.60	6.10	1.50	1.70	22.40	7.55	0.39
3	14.05	4.15	1.85	1.85	20.05	1.75	0.30
4	13.40	4.50	1.15	1.35	19.25	1.65	0.34
5	14.90	6.05	2.65	2.35	23.30	4.20	0.41
6	15.35	6.90	3.75	1.80	24.05	2.25	0.46
7	12.25	6.00	2.90	2.35	20.60	3.20	0.49
8	14.35	6.35	2.30	3.45	24.15	4.95	0.44
9	12.60	7.15	3.30	3.10	22.85	7.15	0.57
10	12.20	6.35	2.05	2.25	20.80	4.10	0.52
11	12.85	7.05	3.30	2.40	22.30	3.15	0.55
12	13.50	6.90	3.05	2.75	23.15	3.35	0.51

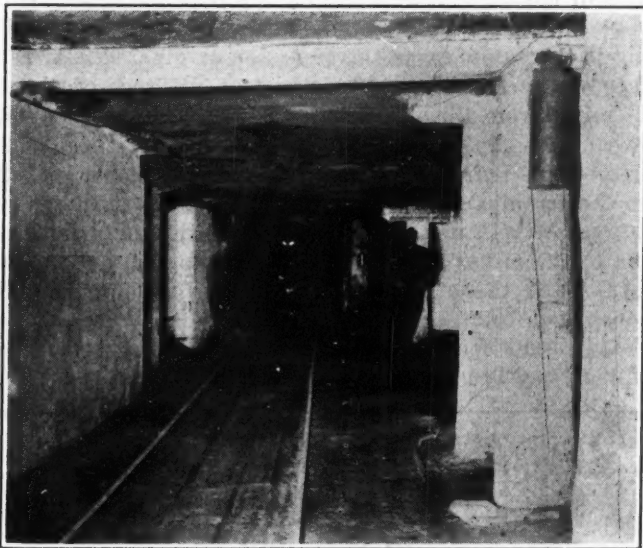
were tested in direct contact with coal dust, that is, with the wrapper removed. Under these conditions the explosives were nearly balanced—i.e., the ingredients contained practically the exact amount of oxygen required to oxidize all of the carbon and hydrogen contained in the explosive to carbon dioxide and water. The gases evolved on detonation of an explosive, in contact with coal dust and with its wrapper removed, were found to contain appreciably less carbon monoxide and



## Fresh Air Base at Shaft Foot

At every coal mine careful provision should be made to afford the men employed underground a chance either of saving their own lives or of being rescued in the event of a serious mine fire or explosion. Several instances are on record of where such men have traveled considerable distances and have reached the shaft bottom, only to be there trapped and finally killed by after-damp, merely because that exit was damaged or because the air at that point has become vitiated.

With this thought in contemplation a few mines in the Middle West have provided facilities for converting



Auxiliary Shaft Bottom, Zeigler No. 2 Mine

All of the ribs in the vicinity of the shaft bottom are faced with concrete approximately 1 ft. thick. These walls serve a triple purpose—they keep the rib from disintegrating, support the roof and act as a protection against fire. A portion of this bottom can be sealed into a fresh air base by closing two sets of doors. Note the neat cleanliness of both floor and ribs. The extinguisher hung from one of the roof supports is good insurance against local fire loss.

a portion of the manshaft bottom into a fresh-air base. Incidentally such a base facilitates rescue and recovery maneuvers in case of emergency. One of the plants where this has been done is the Zeigler No. 2 mine of the Bell & Zoller Mining Co., at Zeigler, Ill.

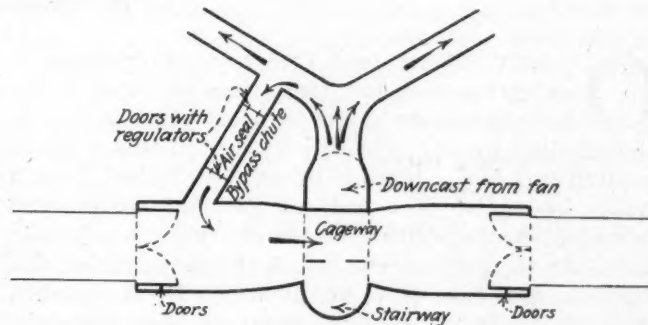
The means whereby this has been accomplished at this particular mine are indicated in the accompanying illustrations. The man shaft contains three compartments. One of these is equipped with a cage for hoisting men and materials, another, that at the northern end of the shaft's cross-section contains a stairway and the third acts as a downcast for the force fan. This latter is located at the opposite end from the stairway compartment. It is thus at the southern end of the opening. In Illinois, it should be remembered, the practice is to establish ventilation with the main haulways acting as returns.

At this mine the fresh air is divided into two splits near the foot of the downcast shaft by two entries coming together in the shape of a Y. A bypass chute connects one of these splits with the haulage entry that passes through the shaft.

For a distance of approximately 30 ft. on either side of the man and material shaft a slab about 1 ft. thick has been removed from the sides of the haulage entry and all ribs in the vicinity of the shaft have been faced with a concrete wall of approximately this thickness.

At the offsets formed by the slabbing wooden doors, faced and reinforced with steel, have been hung. When swung back to their open position these doors do not obstruct the entry in the least.

In the bypass chute also two heavy doors each equipped with a regulator have been hung. When both sets of doors, as well as the regulators, have been closed they form a tight chamber. After a base has been thus established the regulators can be so adjusted as to keep it continuously supplied with fresh air.

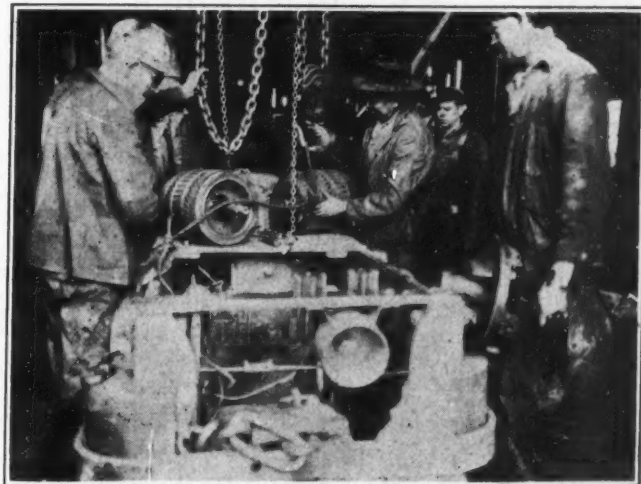


How the Fresh Air Base Is Established

Upon either side of the shaft a pair of doors is hung. When closed these isolate the entire bottom from the rest of the mine thus converting it into either a refuge for survivors of a catastrophe or a fresh air base for rescue and recovery work. A regulator in each door of the pair located in the bypass chute ventilates this base.

## New Safety Lamp Evolved

A NEW TYPE of safety lamp, recently exhibited in Vienna, may prove to be a valuable contribution to mine safety. According to the information now available, the filament of the lamp is made up of a series of semi-circular loops of palladium and the bulb is closed at the upper end with a disc of porous stone. The base fits the ordinary safety lamp socket. When no methane is present in the mine air, the ends of the filament glow a dark red. A small percentage of methane causes the center of the filament to become brilliantly incandescent, and when 8 per cent or more of this gas is present the filament continues to glow even after the current is shut off.



A Rush Job on a 5-Ton Locomotive

In 25 minutes after the locomotive shown in the accompanying illustration entered the shop it was leaving with a new armature replacing one that suddenly developed a shorted coil. Five men did the work while the locomotive runner and brakeman looked on. If the spare armature had not been on hand and in good condition, the locomotive might have been out of service for the day or for several days.

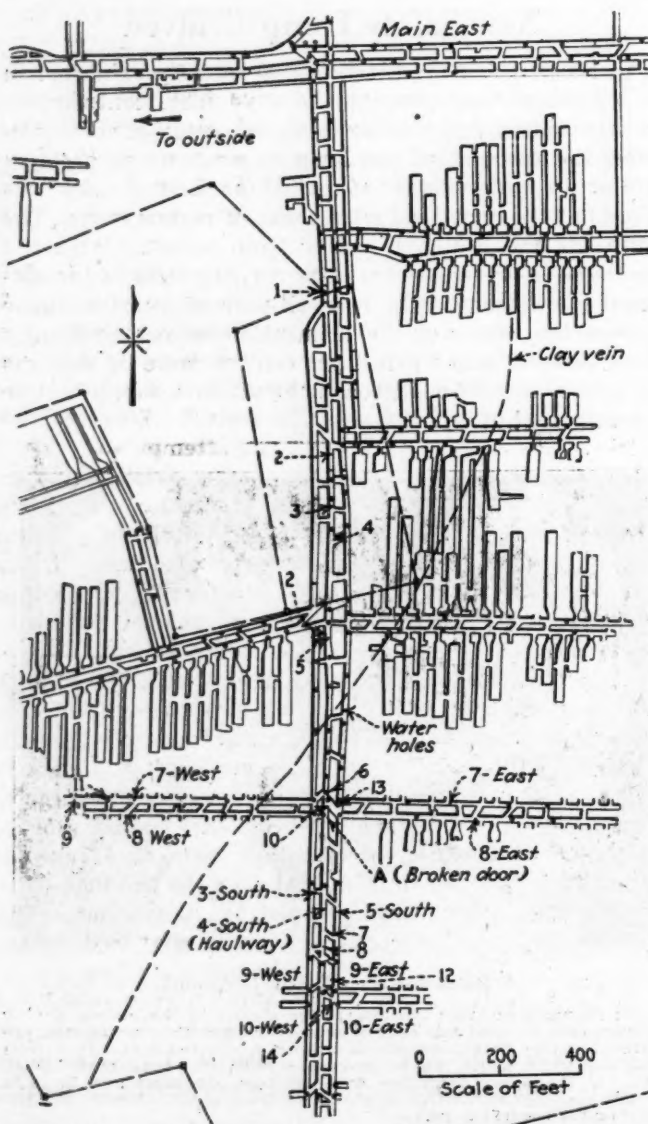
# Evidence at Inquest on Alexander Mine Explosion Shows that Rock Dust Served Its Purpose

Evidence of Coking Was Absent in Same Degree as Rock Dust Was Present—Electric Flash Probable Cause—Loss of Life Due to Afterdamp—Lesson of this Explosion Is That of Preparedness

By Editorial Correspondent

ON NOV. 15 at about 1:15 a.m. an explosion in which five men lost their lives occurred in the Alexander mine of the Glendale Gas Coal Co., at Moundsville, W. Va. The direct cause of this accident is attributed to the ignition by an electric flash from a trolley locomotive of a body of gas that accumulated following short-circuiting of the air through a broken door. An inquest over the bodies of the victims of this explosion was held Nov. 26, at which R. M. Lambie, chief of the Department of Mines of West Virginia, acted as counsel to the prosecuting attorney. It was revealed by the evidence presented that the explosion was confined to a small area because the practice of rock dusting had been followed. An investigation by state mine inspectors substantiated this belief.

The Alexander mine is located in the Panhandle region of northern West Virginia and is in the Pittsburgh No. 8 bed. The main entries terminate in a slope leading to the outside, and the explosion originated near the face of the Fourth South entry at a distance of about 1½ miles from the mouth of this slope. This opening, two others and the workings turned from them constitute the Third South section which is shown in full on the accompanying map. This section is ventilated by a separate split of air, which is one of the three serving the entire mine. The Fifth South entry served as the intake and the other two as returns. Stoppings and doors had been erected in all crosscuts between the Fourth and Fifth South entries. The main, and some side entries, had been rock dusted; but not the back entries.



## Section Where Explosion Was Enfeebled by Rock Dust

Inby point 1 the middle entry is the haulway and was rock dusted to the point marked 7. In the turnout leading to Eighth East entry was located a door, indicated by A, which had been broken down at least an hour before the explosion. Consequently ventilation inby this point was disturbed. Two men on a gathering locomotive were instructed by the night foreman to hang a canvas check where the door had been wrecked.

The following legend applies to this map: (1) Heavy deposit of rock dust, transported by explosion, observed in haulway from this point outby to the Main East headings. (2) First evidence of flame observed. (3) Rock dust coating of unusual thickness on north side of this breakthrough, tapering toward south from 1½ in. to normal in distance of 2 ft. and lying on ribs, bottom and ties. (4) On the haulway from this point inby all rock dust had been swept from ribs; at this point also was observed first evidence of coking. In the Fourth and Fifth South entries in the vicinity of Sixth East entry was observed an accumulation of a mixture of rock dust and fine coal dust. The deposit in the Fourth South entry was larger than that in the Fifth South entry. (5) Roof coal charred; evidence of hot flame. (6) Pronounced deposit of coke on crossbar at latches of switch leading to the Seventh West entry. No stoppings disturbed between Fourth South and Fifth South outby Eighth East. The outby end of a car in the neck of No. 7 room off Eighth East was covered with coke. All stoppings between Seventh and Eighth East, also the one on Fifth South, were blown out. The stopping opposite No. 5 room was blown out from Seventh into Eighth East; all others were blown out in opposite direction. Of the stoppings between Fourth and Fifth South entries, the First South of Eighth East was intact, the second and third were blown out from Fourth to Fifth South, while the Fourth, Fifth and Sixth South of this junction remained intact. The door between Fourth and Fifth South at Tenth East was blown into Fifth South, while all the stoppings between Fourth and Fifth South from Tenth East inby to the face were blown from Fifth into Fourth South. All stoppings between Ninth and Tenth East were blown out. (7) On the haulway inby this point no rock dust had been applied. A body was found here. (8), (9) and (10) At each of these three points a body was found. (11) Point where Joe Stifel was found alive but badly gassed about 6 hours after the explosion. (12) Where trolley locomotive was discovered. (13) Point at which two men were rescued. (14) Location of door, believed by Inspector Brown to have been open for hours prior to the explosion.



The first witness called was Jess Foggie, night foreman, who had complete charge of operations during the night shift. On the night of the explosion a gathering-locomotive crew did not report for work. As this locomotive was needed in the operation of a loading machine, according to Mr. Foggie, he transferred to it the crew from a main-line locomotive and decided to run the larger unit himself with the assistance of another man. On being cross-examined, he admitted that the chief duty of the night foreman is to supervise, particularly matters of safety, and not to act in any way in the capacity of a workman. On this particular night, however, he claimed that he wanted to keep things going.

During the night he was notified that a door had been broken down in the turnout leading from the Fourth South entry to Eighth East room entry. The location of this door is indicated by A on the map. It was smashed by a mine car which ran away from the face of Seventh East, the latter being driven to the rise. How long the door had been broken before Mr. Foggie was notified of its condition was not definitely stated by any of the witnesses, but the elapsed time was approximately one hour.

Mr. Foggie directed the crew on the gathering locomotive to get a piece of canvas and to hang it as a check at the point where the door had been. The explosion occurred shortly after the two haulage men received their instructions from Mr. Foggie. The investigation revealed that the canvas check had been hung. The locomotive used by the men to reach the door was found at a point, indicated by 12 on the map, about 400 ft. inby the canvas, and the bodies of the two men were found about 100 ft. outby the locomotive, as indicated by 7 and 8 on the map.

#### LOCOMOTIVE IGNITED GAS

It is believed, and apparently not without good reason, that the men ran the locomotive inby the check immediately upon completing it and proceeded toward the face of the Fourth South entry. The workings in this section of the mine frequently liberate gas. It appears quite likely, therefore, that an explosive quantity of methane collected in the roadway after the door had been broken and before the canvas check mentioned had been erected in its place. If the accumulation of gas had not extended to point 12 prior to this time, restoration of ventilation as effected by the hanging of the check must have started an outby movement of the gas which the locomotive encountered at the point 12. The explosion resulted. However, the state mine inspectors believe that considerable gas had accumulated when the locomotive started on its disastrous trip to the face. If that were the case, the locomotive must have traveled some distance in an atmosphere charged with gas before an electric flash occurred.

The witnesses were definitely of the opinion that the locomotive was the agent of ignition. Inspector A. E. Lafferty corrected the terminology of other witnesses by stating that it was an electric flash from the locomotive, and not a spark, that caused the explosion; that a spark, if considered as an arc of extremely short length and duration, would hardly ignite gas. One witness said he believed that any one of three electrical parts on the locomotive—namely, the trolley wheel, the commutator or the controller—might have caused ignition. All others thought the trolley wheel responsible.

A bit of evidence favoring the view that the trolley wheel caused ignition was given by State Inspector L. W. Brown who with State Inspector Lafferty investigated the accident. He said that where the locomotive was found the roof sagged to such a degree as to be nearly in contact with the trolley wire. An arc would likely be caused between the trolley wheel and this wire when the former passed under this low point in the roof.

James McClure, mine foreman, arrived at the mine shortly after the explosion. Wearing gas masks, he and two other men traveled on the Fourth South entry as far as Ten-East, near which they found the locomotive and the bodies of the two men, who composed its crew. At this point as well as at the mouth of the Seventh West entry the flame of McClure's safety lamp was extinguished and he and his companions retreated to fresh air.

#### FOUND BREATHING BUT DIED LATER

Two men wearing oxygen breathing equipment were sent into the Seventh West entry, reaching there about 7 a.m., nearly six hours after the explosion. At the neck of the thirteenth room inby, at the point marked 11 on the map, they found Joe Stifel, who was still breathing. These men reported their discovery and expressed to Mr. McClure the belief that the air in this entry was favorable to the use of gas masks. The mine foreman and three other men, wearing gas masks and carrying an oxygen tank from one of the breathing equipments, went after Mr. Stifel. While two of the rescuers administered artificial respiration and oxygen, the remaining two searched for Thomas Robbins who was believed to have been nearby. The body of Mr. Robbins, whose head was wrapped in a piece of wet canvas, was found at 6 p.m. at the face of Seven West, or at point 7 on the map, not more than 75 ft. from where Mr. Stifel was found.

Mr. Stifel seemed to respond favorably to artificial respiration and the administration of oxygen, for Mr. McClure said that he was sufficiently revived to be carried to the surface. However, following further treatment in fresh air, he was rushed to a hospital, where he died a few minutes after his arrival. Robert Pfeffer, machine runner, testified that no attempt was made to move Mr. Stifel into fresh air before artificial respiration was applied. He also added that one of the rescuers who attended to Mr. Stifel worked without a gas mask for some time and was overcome by afterdamp and had to be carried to fresh air, proving that the air was not as free from afterdamp as the men evidently had reason to believe.

Of the two men on the locomotive at the seat of the explosion, one traveled a distance of about 120 ft. and the other 75 ft. Chief Lambie asked several of the witnesses what would have been the result had the men been equipped with self-rescuers. All expressed the belief that at least three of the victims would probably have saved themselves had they been thus equipped. A few were of the opinion that even the two men on the locomotive might have escaped by this means. This, however, is problematical, as these men at least suffered shock. Incidentally, at the point marked 13 on the map two men were rescued. Undoubtedly, they would have escaped through their own efforts had they been equipped with self-rescuers. At the inquest Mr. Lambie remarked that he believed that laws requiring this equipment should be passed.

Another point brought out by this evidence was that rescue operations would have proceeded with greater rapidity had more apparatus, particularly gas masks, been available for immediate use. It showed that men found in an overcome condition should be immediately carried to fresh air before artificial respiration is applied, when an inhalator is not available.

Fireboss James Murray believed that rock dust on the haulway and water on the other two entries stopped the explosion. He admitted that Night Foreman Foggie should have withdrawn the men from the Third South section and cut off the power, upon learning about the broken door. He also remarked that little gas is generated in this mine except where clay veins are encountered. One of these is indicated on the accompanying map. Robert Whitfield, fireboss, testified that he detected a trace of gas at the face of the Seventh North entry on his last run prior to the explosion. Robert Pfeffer, machine runner, cut Eighth East heading the morning before. He detected only a trace of gas at the face of this entry.

L. W. Brown, state mine inspector of the Ninth District, gave evidence derived from an investigation of the accident. This investigation was chiefly directed toward a study of the manifestations of rock dust during the explosion. In the Third South section the haulway or Fourth South entry was rock-dusted from the Main East butt headings as far as 7 on the map. The other two companion entries were not rock dusted. The Seventh and Eighth East entries were not rock dusted and those opposite only partially rock dusted. He believes that the workings outby Eighth East and Eighth West headings did not contribute to the explosion. Outby this point, ventilation on the east side was disturbed by the broken door and the workings on the west were quite wet, being on the dip.

#### WAS OPEN DOOR CAUSE OF EXPLOSION?

Mr. Brown is of the opinion that all places inby the broken door were liberating gas more or less freely. However, he doubts whether the quantity of gas he believes entered into the explosion could have accumulated during the time the door to Eighth East entry was down. He feels that the door leading to Tenth East entry, at the point marked 14 on the map, must have been open for hours prior to the explosion.

That rock dust served effectively to stop the explosion cannot be denied, he claimed, because the original distribution of this dust had been altered by the force of the explosion. At point 1 and outby on the haulway, where the accumulation of rock dust was heaviest, no evidence of flame was observed. Inby from 1 to 4 the rock dust tapered off until it disappeared at the latter point. At 2 the inspectors noticed signs which they believed were evidence of flame, but of this they were not sure. However, at 4 they noted signs which they positively identified as those of flame and coking. Inby at 5 was noted evidence of intense heat on all three entries. In the Tenth South entry in the vicinity of the north end of the breakthrough marked 3, a coating of rock dust of unusual thickness was noted on ribs and bottoms. This tapered toward the south from a thickness of about 1½ in. to normal within a distance of about 2 ft. It was observed that rock dust in the heavier accumulations was mixed with a good deal of fine coal dust. Further information is given in the caption accompanying the map.

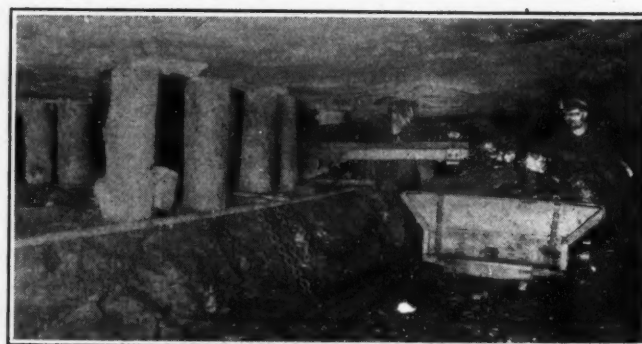
### Search for New Uses of Coal

Walter Barnum, president of the National Coal Association, before the International Conference on Bituminous Coal said: "Research is of great importance to the general public as well as to those directly concerned in the mining of coal, and this is equally true whether reference is made to coal for domestic purposes or as industrial fuel. Our modern industrial organization, our mining, our manufacturing, and our transportation alike are now and will continue to be dependent upon a constant supply of bituminous coal. Improvement in methods of combustion which bring about a more complete utilization of the heat values contained in that fuel will benefit the consumers of all commodities."

#### COAL MEN'S INTEREST IN RESEARCH

"Speaking for the bituminous operators of this nation, I can vouch for their lively interest in all research work pertaining to new utilization of coal. Owing to the great potential capacity of the bituminous mines of the United States, our mine owners will welcome any method of increasing consumption or adding value to their product. When, for instance, the production of motor fuel by gasification and liquefaction of coal has been established on a commercial basis, the bituminous coal operator will have the pleasant experience of a heavy demand from a new customer. It is not amiss to note at this point that the Research Committee of the National Coal Association recently has been in touch with the principal fuel specialists of Europe, as well as of this country, with a view to presenting a world-wide summary of activities with respect to coal research. We hope this summary, which will be supplemented from time to time as important research activities are completed, will have the effect of bringing about a practical coordination of the numerous activities in this country, at least. It is my observation that nearly every scientist and engineer engaged in research work necessarily has his eyes glued to the problem before him; he doesn't have opportunity to see the entire picture. Our association proposes to paint that picture with the thought that it will not only do away with unnecessary duplication, but also that it will prove a helpful guide and inspiration to the actual research worker, to the man who is producing coal and to the general public."

#### Saves Much Lifting of Bottom



#### Delivering the Goods

This 22-in. Elchhoff conveyor is 230 ft. long. It brings coal down the room from a cross conveyor that is employed in robbing back a wide pillar. It is driven by a single-acting air engine with a pull-back attachment. The motor-driven air compressor that furnishes air to these machines also supplies air for the rock drills used in lifting bottom on the entry.



## Is Spontaneous Combustion of Coal Attributable, In Part, To Oxidation of Occluded Gases?

Since All Coals Are Porous and Contain Flammable Gases the Conclusion Is Reached that Preliminary Heating of Fine Coals May be Due to Oxidation of Occluded Methane—Comminuted Timber Also an Influence

By D. W. Rees

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**A**LTHOUGH the problem of spontaneous combustion of coal is not yet completely solved, sufficient data have been collected to permit of a general understanding of the subject. Extensive researches, of great value and interest, have been conducted to determine which of the various constituents of coal are responsible for its spontaneous ignition and combustion. But it is a rather surprising fact that these researches have been directed toward the volatile matter and the pyrite contained in the coal while little or no study has been made of its occluded gases.

### IGNITION TEMPERATURES VARY GREATLY

The probable reason that the possible effect of these gases has not been given serious thought is because the temperature of ignition of fine coal is low while that of methane is comparatively high. The "danger point" for many finely-divided coals is 150 deg. F. and actual ignition will occur at temperatures of from 300 to 600 deg. F., depending upon the nature and the fineness of the material. On the other hand, the temperature of ignition of methane varies from 1,200 to 1,400 deg. F. and may have a wider range depending upon its purity, the admixture of other combustible gases and whether it is confined or unconfined.

A broad study of spontaneous combustion would indicate that the following facts are worthy of emphasis: (1) Methane and oxygen spontaneously ignite under a pressure of 20 atmospheres or approximately 300 lb. per square inch. (2) The amount of oxygen absorbed by coal in place, and the quantity of methane contained in it, give rise to pressures in excess of 300 lb. per square inch. (3) The rate at which oxygen is absorbed and methane is evolved varies with the fineness of the coal. (4) Coals that have a high ignition temperature, such as anthracite, are subject to spontaneous heating when finely divided and to spontaneous ignition when in contact with dry and comminuted timber. (5) Danger of spontaneous heating becomes greater with increased porosity of the coal, and porous coal is found in thick beds and in areas of thick coal in beds that are generally of normal thickness. (6) Moisture is an important factor in initiating heating of coal, and exerts a catalytic action in certain gaseous reactions.

### COAL POROSITY AN IMPORTANT FACTOR

The importance of the porosity of a coal in influencing its spontaneous heating and ignition has been underestimated if not entirely overlooked. This porosity can be estimated from the specific gravity and is found to vary from 3 to 10 per cent of the volume. If a coal having a porosity of 10 per cent absorbs 3 volumes of

oxygen, the pressure of the gas within its pores will be approximately 450 lb. per square inch and the temperature resulting from this compression may be estimated at 1,200 deg. F. The greater the porosity of the coal, the lower the pressure and the temperature of compression. Actual experience has also shown that the more porous the coal the greater is its tendency toward heating.

### OXYGEN ABSORPTION COMPARATIVELY UNIMPORTANT

The rise in temperature due to the absorption of oxygen is, in itself, of but little importance. This is because of the great difference in weight between coal and oxygen (the former being 1,000 times as heavy as the latter) while their specific heats are practically the same. However, the chemical reaction between methane and oxygen offers an explanation of the temperature increases that actually occur. As an example, consider a coal weighing 80 lb. per cubic foot and containing 7 cu.ft. of methane per cubic foot of coal. Assuming that the specific heat of the coal is 0.2 and that the heating value of methane is 995 B.t.u. per cu.ft.,\* complete oxidation of the methane will liberate  $7 \times 995$  or 6,965 B.t.u. The rise in temperature of the coal, therefore, will be  $6,965 \div (80 \times 0.2)$  or about 435 deg. F. If the original temperature of the coal was 65 deg. F. the final temperature will be 500 deg. F. In addition, crushing may be assumed to add 50 deg. to the temperature of the resulting fine coal. As previously stated, some finely-divided coals will ignite at temperatures below 300 deg. F. while others have much higher ignition temperatures, sometimes in excess of 600 deg. F. But in practically all cases timber is present to initiate combustion. Initial heating, therefore, is due to the reaction between methane and oxygen in the pores of the coal. And the heating process is rapidly developed by the pyrite or volatile matter, or both, that may be present.

### ANTHRACITE MAY IGNITE SPONTANEOUSLY

Since all coals are porous and contain varying quantities of flammable gases the conclusion is reached that all finely-divided coals are liable to spontaneous heating as distinct from spontaneous combustion. Anthracite, which is low in volatile matter and usually contains but small quantities of pyrite, is capable of igniting spontaneously. At least three instances of such ignition at the bases of dumps of fine coal have been known. When outbursts of gas take place in anthracite beds, the dusts that are released or produced by such occurrences often heat up to 150 deg. F. or more, and this heating action will occur even when such

\*At 60 deg. F., 30 in. of mercury and saturated with water under these conditions.

dusts are exposed to the cooling influence of the ventilating current. In South Wales, spontaneous ignition of anthracite takes place only in thick beds, near faults or other abnormalities, where the porosity of the coal is high.

Wherever coal of high porosity is encountered in a bed, special precautions should be observed when mining

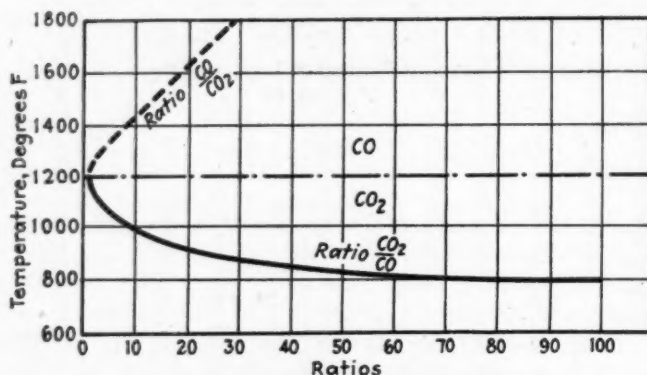


Fig. 1—Ratios of Products of Oxidation

Below the 1,200 deg. line this curve shows the ratio of  $\text{CO}_2$  to  $\text{CO}$ , at various temperatures, in the gases resulting from the oxidation of glowing carbon. Above 1,200 deg. it shows the ratio of  $\text{CO}$  to  $\text{CO}_2$  in a mixture of these gases. It is of practical help in determining the approximate temperature of a heated area in a mine.

it. The fact that the seam as a whole is not liable to spontaneous heating only adds to the likelihood of such action occurring in isolated sections, particularly where highly porous coal is in contact with timber. The physical factors, therefore, on which the dangers of spontaneous heating depend are the porosity of the coal, its specific heat and the kind and quantity of gas it contains. This latter factor is largely dependent upon the nature of the roof and floor of the bed, the proximity of faults and the occurrence of areas of local thickening.

#### ACTUAL IGNITION DEPENDS ON MANY FACTORS

The continued rise in temperature to the point of spontaneous ignition is dependent upon several factors, among which are: The rate at which occluded gas is released from the coal; the rapidity with which the coal absorbs oxygen; the presence of flammable substances; and the ignition temperature of the volatile matter and carbon of the coal. During the preliminary stages the cooling effect of the ventilating current is a highly important factor. The extent and amount of coal crushing due to pressure from the roof and sides tends to increase the rate of heating. The purity of the occluded methane is also of importance. The ratio of methane to inert gases is less than 2 in bituminous, about 3 in semi-bituminous and 5.5 in steam and anthracite coals. As has been indicated previously, the danger of spontaneous heating of anthracite may be greater than that of bituminous coal if an area of high porosity occurs in the former. This is particularly true if timber is present.

The explanation of the preliminary heating of coal by oxidation of the occluded methane also serves to account for the analyses of the gases resulting from such spontaneous heating and ignition. According to the reaction  $\text{CH}_4 + 2\text{O}_2 = \text{CO}_2 + 2\text{H}_2\text{O}$ , the volume of carbon dioxide formed should be half of the oxygen absorbed. Actually it is only about 20 per cent. Similarly, the volume of water vapor produced should be the same as the volume of oxygen absorbed. Actually it is approximately 40 per cent. This "disappearance" of the

products of combustion can be explained only by assuming that a certain percentage of them are absorbed in the pores of the coal and replace the original gaseous mixture present therein. Those gases given off represent the excess due to expansion of the products of combustion with increase in temperature. And, considering the pressure in the pores, the expansion is always somewhat greater than the absorptive capacity of the coal.

One guide to the temperature of the coal mass is the ratio of carbon dioxide to carbon monoxide in the resulting gases. This applies only to glowing carbon after ignition has occurred. Under actual conditions, the temperatures will be somewhat higher than those indicated in Fig. 1, for carbon dioxide is produced by slow oxidation of carbonaceous material as well as by actual combustion. The quantity of gas and the amount of volatile matter present in the coal will also cause slight variations in the actual temperatures. Fig. 1 indicates the ratios of  $\text{CO}_2$  to  $\text{CO}$ , and of  $\text{CO}$  to  $\text{CO}_2$ , in a mixture of these gases in equilibrium with glowing carbon at the temperatures shown. Fig. 2 shows the percentages of carbon monoxide and carbon dioxide, at various temperatures, present in a stable mixture of these gases in the presence of glowing carbon.

#### GASES EVOLVED INDICATE FIRE'S SIZE

Gas analyses, apart from their application to the problems of mine safety and ventilation, do not usually have a practical significance to the men in charge of mining operations. Figs. 1 and 2, if due allowance be made for local conditions, will serve to give a fair idea of what is occurring in a heated area. Since the curves are based on the combustion of pure carbon they do not apply strictly to coal. But they do show, in a general way, the change in the ratios and percentages of carbon monoxide and carbon dioxide with different temperatures. In this manner gas analyses will enable the practical operating man to roughly determine the temperature in a heated or burning area. For example, if the ratio of  $\text{CO}_2$  to  $\text{CO}$  is found to be 6, the temperature of the heated area is about 1,050 deg. F. If this ratio drops to 32, the temperature has fallen to approximately 880 deg. F. Other parts of the curve can be similarly interpreted. The temperature can also be estimated from Fig. 2 if the percentage of

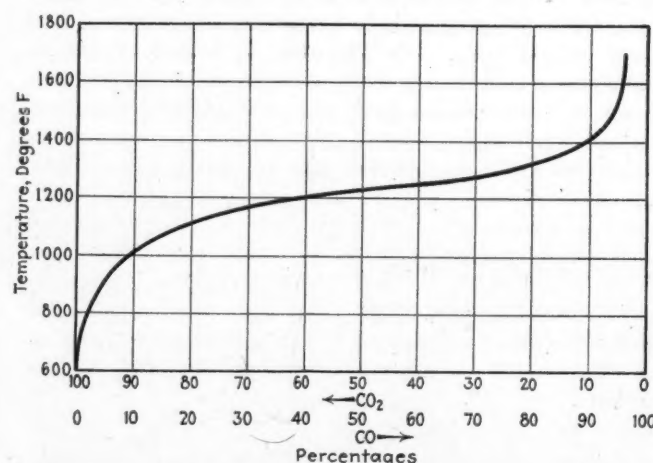


Fig. 2—Composition of Gases from Oxidation of Carbon

Another means of estimating the temperature in a heated or burning area in a mine is furnished by this curve which represents the percentages of  $\text{CO}$  to  $\text{CO}_2$  in a mixture of these gases in equilibrium with glowing carbon at various temperatures. Since the curve refers to pure carbon the temperatures determined from it are only approximate when applied to coal.



either CO or CO<sub>2</sub>, is determined in the gas coming from the heated area.

The volume of gases produced after ignition has occurred is an indication of the magnitude of the fire. For instance, if an air current of 10,000 cu.ft. per minute is found to contain 4 per cent of carbon dioxide the weight of CO<sub>2</sub> produced is about 50 lb. per min. If we assume that 3 lb. of gas are formed from each pound of coal completely burned, the weight of coal on fire in the above example is approximately 17 lb. per min. It is unusual to find such a large quantity of carbon dioxide produced but the method is also applicable to small fires. In the latter case, the chief difficulty lies in the accurate measurement of small air currents.

### Bituminous Coal Will Not Be Replaced

At the present time a rapid development of our water power resources is taking place. Some people may be so impressed by the number of hydro-electric installations now being planned or constructed as to forget how limited is the opportunity for future developments of the same nature, said Walter Barnum, president of the National Coal Association, speaking before the International Conference on Bituminous Coal. A report of the United States Geological Survey in 1924 estimates the theoretically usable capacity of all water power resources in the United States as 72,000,000 hp. Of this total approximately 9,000,000 hp. have already been developed. Therefore, the power theoretically remaining and available amounts to about 63,000,000 hp.

This figure sounds rather imposing and suggests the possibility of a great expansion in the use of this source of power, but that expectation will be considerably modified by a study of its geographical distribution. There is located east of the Mississippi River and north of the Ohio and Potomac Rivers only about one-sixth of our total undeveloped water power, representing a possible development of 11,880,000 hp. of hydro-electric energy. But the development of water power sites has gone further in this section of the country than in any other. In this area nearly one-third of the theoretical capacity has already been developed, while in New England the development has reached 54 per cent of the possibilities. How relatively unimportant this remaining undeveloped water power is to the section of the country under discussion can be appreciated when it is understood that that territory already consumes annually more than ten times as much bituminous coal as would be required to generate this additional power by steam. Further, it is a fact well known that because of the increasing efficiency of steam generation probably none but the most economical remaining water power sites will be developed.

#### BITUMINOUS WILL BE FUTURE FUEL

These few statistics will emphasize the fact that bituminous coal has been and must continue to be our chief reliance for the development of the enormous power necessary to maintain modern industrial life.

Since there is no other fuel available in quantity, consideration may well be given to the way in which the bituminous coal mining industry has met its responsibility. Fortunately we have the record of the industry for the past half century from which to demonstrate its efficiency in fueling the nation. Ability to render service in the future may be judged from past performance.

### Progress of Electric Shot-Firing

A large percentage of the blasting in quarries, shafts and tunnels, and from 15 to 25 per cent of the shots fired in mining operations, are detonated electrically, according to data collected by the Bureau of Mines, Department of Commerce. Electric shot firing is only one method of igniting explosives, but it is rapidly spreading, and because of certain inherent safety features, should be encouraged. The Bureau of Mines is interested in electric shot-firing because of its use in mining, and especially because electric methods, when properly applied, are undoubtedly safer than other methods commonly used.

Electrical problems of many kinds must be solved in dealing with the various phases of electric shot-firing. Success in using an electric detonator is closely linked with the resistance of its bridge, the resistance of its leg wires, and the insulation of its current-carrying parts. The proper layout of a circuit where a number of shots are to be fired simultaneously depends not only on the types of detonators that are used and their arrangement and interconnections, but also on the size and insulation of the wire leading back to the source of power, and even on the source of power itself. Various types of electric shot-firing machines have been developed, and these offer still another field for study.

In investigations of electric detonators and electric blasting equipment, the oscillograph is valuable because it can record electrical activity over extremely short intervals of time. By its use more complete information concerning electrical performance can be obtained than by any other means.

### Mining Converters with Load Control

What is said to be the first use in mining service of load control on rotary converters will be made by the Benedict Coal Corporation at St. Charles, Va. In the substation on this property, soon to be placed in operation, there will be two 200-kw. 275-volt rotary converters with full automatic control, each machine being provided with protective devices to permit obtaining maximum power output without damage to the apparatus.

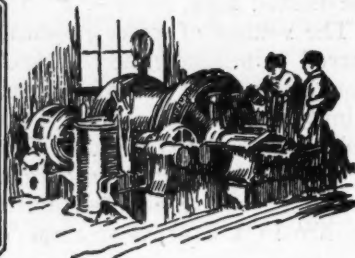
Normally a single machine will run to handle the load of three feeders. If, however, the load should exceed the capacity of this machine, the automatic equipment is arranged to start the second unit after a definite period of time has expired. This time delay prevents starting the second machine unnecessarily by momentary overloads. When the power is no longer needed, the second unit will automatically shut down.

Should the load increase to exceed the safe carrying capacity of both machines, one of the outgoing feeders will be automatically tripped, thus reducing the load to a safe value and, at the same time, not interrupting service on the other two feeders. Should an overload occur when one machine is running alone two feeders will be tripped off but service will not be interrupted on the third.

Should the running unit be shut down because of a hot bearing, winding failure or other cause, the second unit will automatically start and restore service. Either machine may be made "leading," and both units may be run continuously if necessary. The entire station may be shut down by opening a small control switch located at some distance from it.



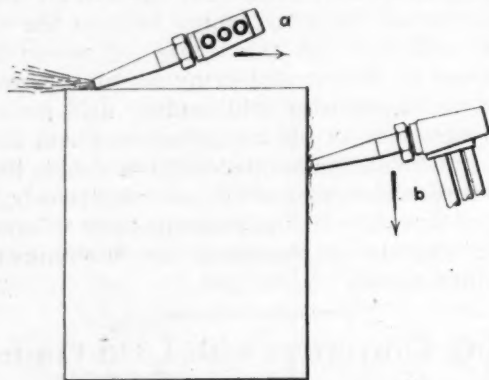
## Practical Pointers For Electrical And Mechanical Men



### Cast Iron Can Be Successfully Cut With Oxyacetylene Torch

"Can cast iron be cut with the oxyacetylene torch?" is a question often asked by mine-equipment maintenance men. Cast iron can be cut easily when the proper cutting-torch tips are used and the correct procedure is followed.

For cutting cast iron the manufacturers of oxyacetylene equipment make special cutting tips. The



**Torch Positions When Cutting Cast Iron**

Cutting tips that are especially adapted for cast iron must be used in order to secure the best results. After the preheating flame produces a dull-red line in the cast iron the head of the torch is turned so that the tip points to the work as shown in the illustration.

ones used for cutting cast iron differ from those designed for other purposes because they have about twice the usual number of preheating holes, these usually being larger than in the ordinary tip. A preheating flame two to three times the size of that given by the ordinary tip is obtained, thereby furnishing the extra heat necessary for the cast iron cutting. The manufacturer's chart will indicate the correct gas pressures to use for any particular tip.

If possible the material to be cut is placed in such a position that the operator can work on the top of it. A bushy flame about 1 in. to 1½ in. long is used. This kind of flame is obtained by allowing a slight excess of acetylene to flow to it. The torch is then moved slowly back and forth over the work, in the line of the cut, until the preheating flame causes a dull red line to show. The torch is now moved to one side and the head turned so that the tip points to the work on an angle as shown at A in the accompanying illustration.

When the spot is hot enough the high pressure oxygen is turned on and as the iron is cut away the torch is moved slowly across the work on the line of the desired cut. An oscillating motion of about ¼ inch is given the torch and the angle of the tip is maintained. If a black spot shows up, the high-pressure oxygen is cut off until it is heated when the cutting can be resumed.

In this way a groove is soon cut across the work and when the end is reached the torch is moved slowly down the side as at B in the illustration, time being allowed for the high-pressure oxygen to carry the cut all the way across the work. Thus the cut is easily carried to the bottom of the piece, the hot slag supplying sufficient heat throughout the work.

While doing this cutting the operator should protect his hands and arms with gauntlet gloves. The sleeves of his coat or work jacket should be down and pushed into the gauntlets. Of course goggles should be worn and a hat or cap will add to the operator's comfort.

A common cut of this kind that has come to my attention is the removal of a cast wheel from its axle.

On this job the cutting procedure above described is followed and carried as close to the axle as possible without cutting into it. A bucket of water should be at hand and while the work is still hot the water is poured onto it. This breaks the thin remaining section of metal and the wheel comes off with ease. This only takes a few minutes and the cost is small as compared to the old long and laborious sledge-hammer and strong-arm method of removing a wheel. This, however, is only one of the many cutting jobs that can be handled by welding and cutting equipment.

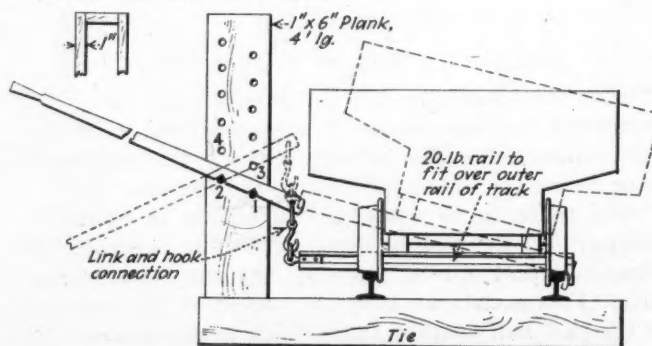
Clearfield, Pa.

J. F. ELDEE.

### Labor Saved in Unloading Cars

Where it is desired to unload cars of rock or dirt alongside of the track the arrangement shown in the accompanying illustration will be found to be simple to construct, and will save labor over unloading by hand.

With the device shown the car is overturned by successively changing the bearing pin upwards on the "jack." Two pins are used; for instance when the lever is resting on the pin in the No. 1 or starting hole, the other pin is inserted in hole No. 2, the lever pushed down and when the notch on it clears hole No. 3 the pin is inserted and the lever raised from pin No. 2 leaving it free to go up another hole into No. 4, and so on until the car is turned over.



**Easily Made: Easily Operated**

The bar that hooks to the track and connects to the raising lever goes in the center of the car between the wheels.



# Underground Operation

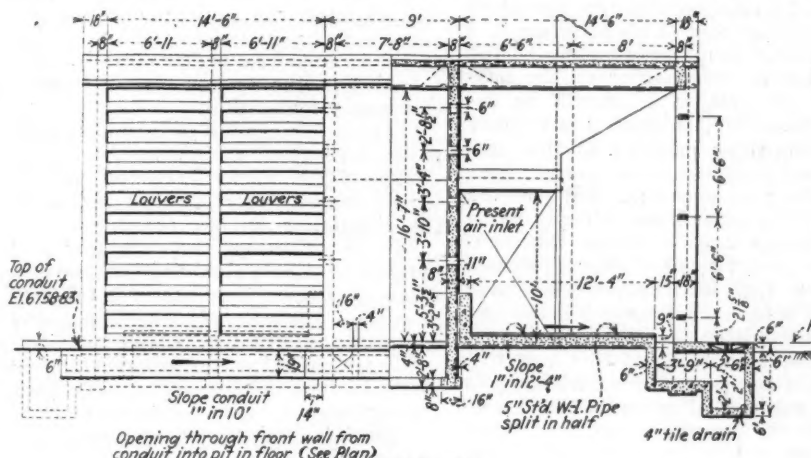
## Preheated Air Keeps Shaft Free of Ice

The two 765-ft. shafts at the Navajo, No. 5, mine of the Gallup American Coal Co., at Gamarco, near Gallup, N. M., are not dry, and in the winter the intake airway formerly gave much trouble; ice forming and impeding ventilation. Consequently, the management decided that the air should be preheated. It was realized that the piping used for this purpose would interfere with the passage of the air to the fan, and consequently the opening to the fanhouse was greatly enlarged. The pipes are divided into four banks, any or all of which can be utilized. Thus, the heat can be regulated to meet the varying temperature of the outside air.

With this arrangement there has been no difficulty in eliminating ice in the shaft. The heat of the air entering the mine can easily be raised 50 deg. Horace Moses, the manager, says that the system has not only been of great value in preventing accumulations of ice, but has also protected the shaft from the disintegration that is usually caused by frost in the shaft walls.

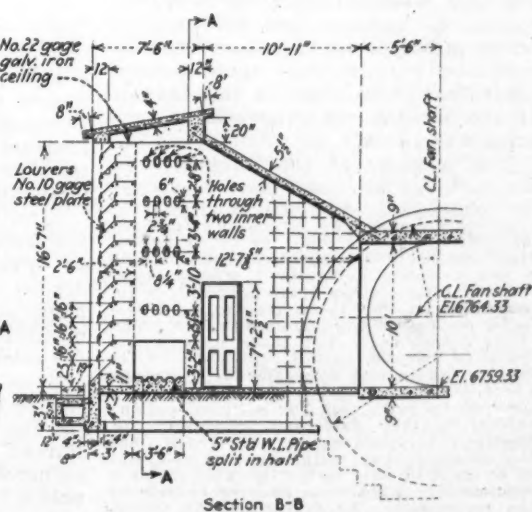
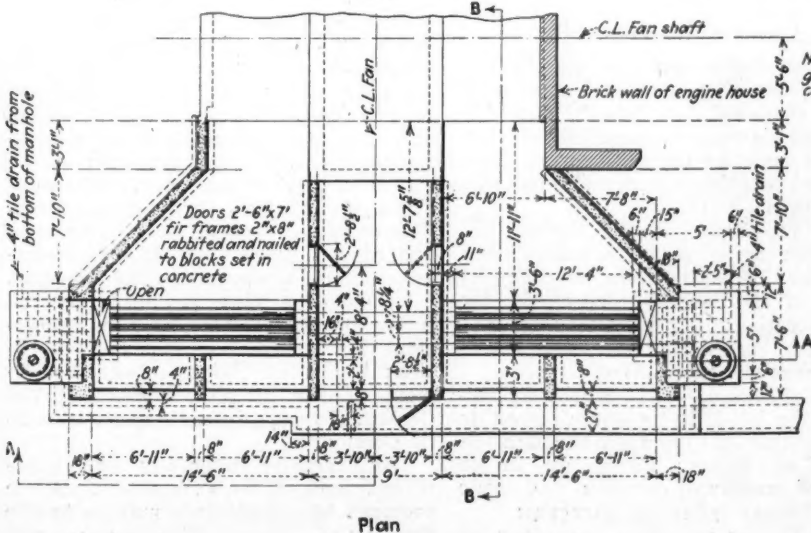
Air enters the mine through a man-and-material shaft which measures 10 ft. 6 in. x 25 ft. 3 in., inside dimensions. The shaft, which is concreted from top to bottom, consists of two hoisting compartments and one air compartment, the last being separated from the other two by a 9-in. concrete wall. The air compartment has a cross-sectional area of 95 sq.ft., which is ample for all the mine requirements.

A 6x12-ft. reversible fan is provided capable of delivering 300,000 cu.ft. of air per minute. The bearings of the fan are equipped with thermostats, so that if they become overheated the fan will stop automatically. A gong announces to the watchman or others the stoppage of the fan. This machine, which is operated as a blower, is delivering at present approximately 100,000 cu.ft. of air per minute. It is driven by a 275-hp. motor, but by removing the belt and throwing in a clutch, it can quickly be made operable by a steam engine provided for that purpose. Steam is always available, for the mine has its own power plant. It should be added that the workings are not gassy.



## Equipment Installed at Gamarco to Heat Air Entering Mine in Winter

In many intake shafts, where water escapes from behind the shaft lining, ice forms in winter weather and blocks the air current. At Navajo No. 5 this was the cause of much trouble so the intake-way to the fan was enlarged and fitted with four banks of pipes. Steam can be supplied to any one or all of these, raising the temperature of the intake as desired. As much as 50 deg. of temperature correction can be attained. The preheating has had the further advantage of protecting the concrete from freezing. If no return other than the preservation of a shaft were received, the preheating of the air would be well worth while wherever a shaft is deep and the lining continuous.





## News Of the Industry



### Little Chance Seen for Passage Of Coal Measure by Congress; Parker Committee to Act Jan. 11

By Paul Wooton

Washington Correspondent of Coal Age

The Committee on Interstate and Foreign Commerce of the House of Representatives will consider the Parker coal bill in executive session Jan. 11. The bill is the unfinished business before the committee. Extended hearings were held last year. The plan is to vote on that date on a motion to report the bill favorably.

While Chairman Parker has not expressed his thought on the subject in just these words, his views, in substance, are as follows:

The action of the Committee on Interstate Commerce at the last session was not a rejection of the idea of coal legislation. In fact, the committee was impressed with the advice of Secretary Hoover, who recommended that the industry be given a period in which it could set up by voluntary means the machinery for fact finding and for the adjustment of labor disputes. This was regarded as preferable to the accomplishment of these purposes by law.

In effect, the action of the committee was to place the industry on probation in the hope that by the time the Congress would reconvene for its short session something would have been done toward wage adjustment corresponding to the accomplishment in that particular by the anthracite industry and toward the collection of essential facts.

Neither one of these things has been done. So far as the committee has been able to learn no substantial progress has been made. Instead the increased volume of business and the rise in prices of soft coal, together with the increases in wages, have made it more likely than ever that the termination of the present wage agreement will bring a deadlock.

The members of the committee in favor of legislation are more convinced

than ever of the need for it. Moreover, they have a direct plan from the President, who, in his message, reports that the bituminous industry has failed to set up machinery for arbitration and recommends legislative action to that end and to provide for the emergency distribution of coal. Both of these items are worked out in the Parker bill.

"It is true," said Representative Parker, "that the President did not mention fact-finding in his latest message, but as he had done so in two previous messages the committee feels that the fact-finding provision of the bill will be accepted by the President as an essential part of his program."

Speculation by persons outside of the committee on the chances of the passage of the bill, if it should be reported favorably, is that it will have little chance for passage at this session. Less progress seems to have been made on the Copeland bill in the Senate. The upper house already has a full program and is facing time-consuming controversies over political questions. Half of the session will have gone by before the Parker bill can get out of committee and it seems hardly likely that legislation of this sort will be able in the short time remaining to run the gauntlet of action in the House, action in the Senate, in the conference committee and in the approval of the conference reports.

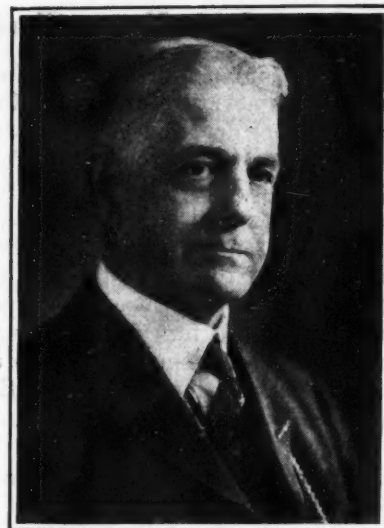
#### Cochran Analyzes Bill

In view of the fact that the Parker bill is certain to be much discussed during the next few weeks, there is presented herewith an analysis of that measure made by Ira S. Cochran, Commissioner of the American Wholesale Coal Association:

"The provisions of the Parker bill fall under three separate heads, each of which depends upon a different branch of the federal government for administration: (1) Fact finding; (2) mediation, conciliation and arbitration; (2) emergency distribution.

"**Fact Finding.**—This particular section of the bill is to be administered by the Secretary of Commerce through the Bureau of Mines. Facts are to be gathered, analyzed, compiled and made public for the following purposes:

"(1) To protect from shortages of



© Harris & Ewing

Representative James S. Parker

coal through the government and its agencies; the instrumentalities of interstate commerce, and the public.

"(2) For the enactment of further emergency legislation.

"(3) To determine a sound public policy regarding the industry.

"The facts to be collected are of three classes, affecting the producer, the distributor and the consumer.

"Those affecting the producer are number of mines, number of employees, rates of wages, time worked, tonnage produced, method of marketing and selling price.

"Those affecting the distributor are method of marketing and distribution; selling price.

"Those affecting the consumer are consumption and stocks.

"**How the Facts Are to Be Collected.**

—By filing reports with the Bureau of Mines on order of the Secretary of Commerce, in such form as he may prescribe, under oath if he desires, and at such time as he may designate. This provision may make necessary a complete revision if not a duplicate set of books; it may or may not conform to Treasury practice for tax purposes. Failure to so report is punishable by a fine of not more than \$5,000 or imprisonment for not more than one year.

"Requisition may be made on the following departments of the government for information in their possession: Geological Survey of the Department of the Interior, Bureau of the Census, Bureau of Foreign and Domestic Commerce.

"By executive order any other executive branch of the government may be required to submit information to the Bureau of Mines. This section will

EDITOR'S NOTE—The foregoing Washington letter reflects certain views of official Washington. Due to the fact that policy as a rule prevents government officials from permitting their views being quoted directly, the authority for these reports is necessarily somewhat vaguely referred to. The views reflected are not those of any one group of officials, but of different men, in the legislative and executive departments. There is no necessary connection between their views and COAL AGE editorial policy; neither do they necessarily represent Mr. Wooton's personal views. It is felt that the opinions thus faithfully reflected will be of great interest to the industry. Where opinions are cited from sources outside of the government, the source will be specifically stated.



make available to the Bureau the tax returns of anyone connected with the industry, including miners or any consumer, if the Bureau can persuade the President to issue an executive order making information available.

"All records are transferred to the Bureau of Mines from the U. S. Coal Commission, the Federal Fuel Distributor and the U. S. Fuel Administration.

**"Mediation and Conciliation.**—The President may direct the Secretary of Labor to conciliate differences, encourage arbitration or act as mediator; appoint one or more persons to act as mediators, or establish temporary boards of mediation. Such agency may have access to all information in any government department which will inform it as to conditions in the industry on direction of the President.

**"Emergency Distribution.**—The administration of this section is a divided responsibility between the Interstate Commerce Commission and the Federal Fuel Distributor. Upon the date of a declaration by the President of the existence of an emergency the provisions of Sections 2, 3, 4, 5 and 7 of the act of 1922 creating the Federal Fuel Distributor is revived.

"These sections empowered the Interstate Commerce Commission to provide by priority order, embargo or otherwise preferential movement of coal; equitable distribution of coal in the public interest; prevent the purchase or sale of coal at prices unjustly or unreasonably high.

"Provision also is made for a Federal Fuel Distributor, whose duties shall be to ascertain the location and extent of shortages in fuel, the fields of production and principal markets, the means and methods of distribution, the price normally and usually charged for coal, whether current (emergency) prices are just and reasonable, nature and location of consumers, what consumers are entitled to priority in distribution and transportation of fuel and to what extent, any other facts relating to production, transportation and distribution; report findings and recommendations to the Interstate Commerce Commission.

"The information thus obtained is used by the Interstate Commerce Commission to determine the necessity for orders on its account. It may or may not act upon the recommendation of the Federal Fuel Distributor as it sees fit. It was upon the provisions of this act as well as upon the provisions of the Transportation Act that the service orders of 1922 were issued, and a preferential class of consumers was created.

"Under the Parker bill all information in the possession of the Bureau of Mines is available to the Interstate Commerce Commission for use in any proceeding by it in connection with its emergency powers as laid down in paragraph 15 of section 1 of the Interstate Commerce Act.

"Violation of any order of the Commission or furnishing false information to the Commission or the Federal Fuel Distributor is made a misdemeanor, punishable by a fine of from \$1,000 to \$20,000 and/or imprisonment for not more than two years."

### **Schwab Urges Closer Co-operation of Industries, Farmers and Bankers to Hold Prosperity**

Charles M. Schwab, chairman of the Bethlehem Steel Corporation, believes that "efficiency and economies upon a progressive scale, not merely in production but in marketing methods as well," offer the best protection for our markets against foreign competition.

In a statement prepared with the idea of appraising conditions "at the turn of the year," Mr. Schwab said the United States is enjoying "astounding" prosperity and appealed for co-operation in maintaining it.

"At no time in history," said Mr. Schwab, "have the people of an entire nation enjoyed the prosperity prevalent in the United States today. At no time have people dreamed of the universal use of luxuries which we accept as our birthright. Our material prosperity is astounding, so remarkable in fact that business men are coming from all parts of the world to study our methods.

"It is my hope that our spiritual and cultural prosperity will now show similar development. We have conquered poverty. Let us conquer disease. We have abolished illiteracy. Let us develop finer methods of education. We have saved time and increased production by making machines do our work. Let us make

worthwhile the additional leisure now on our hands.

"We still have many problems before us. Our very prosperity makes foreign manufacturers cast envious eyes at our markets. To maintain our markets and our present high wages with reasonable profits for manufacturers we must realize efficiency and economies upon a progressive scale, not merely in production but in marketing methods as well.

"Both in industry and in agriculture there must be co-operation among the factors involved to an extent never before considered necessary or even desirable. Farming must be conceived on a more scientific basis. There must be greater integration of agricultural producing units. We must apply to our fields the methods of large-scale production which have been found successful in our factories. Waste in marketing must be minimized on the farm as well as in industry.

"These things can and will be done through the co-operation of heads of industries, farmers, bankers, Wall Street men and ranchers. We have the greatest country in the world, and with intelligent effort, a feeling of humility and with faith in one another nothing is beyond our power of achievement."

### **Woods Faces Stiff Fight For Confirmation**

Confirmation of the nomination of Cyrus E. Woods, of Pennsylvania, recently named by President Coolidge to succeed Frederick I. Cox, of New Jersey, on the Interstate Commerce Commission, is expected to be bitterly contested in the Senate. It was promptly shelved by the Interstate Commerce Committee of the Senate when referred to it last week and will not be taken up for consideration until Jan. 6. Senator Sackett, of Kentucky, who made the motion that it be laid over until that date, declared there would not be five votes for confirmation in the committee, and even if the committee reported favorably the nomination would be defeated in the Senate.

#### **Decry Effect on Lake Rate Case**

A number of Senators are being bombarded with telegrams from coal producing states charging that the naming of Woods would change the complexion of the Commission on the lake cargo case, in which the Kentucky-West Virginia fields particularly are resisting the efforts of Pennsylvania fields to widen the rate differential between the two.

In its original decision in this case the Commission upheld the rates favorable to the Kentucky-West Virginia fields by a margin of one. Commissioner Cox voted with the majority. Now the President, it is charged by Senator Sackett and others, disregard-

ing a precedent whereby commissioners have been appointed, is trying to throw out the New Jersey man, who has five years' experience on the regulatory body, to make way for a Pennsylvania banker-lawyer-diplomat, who was for nearly twenty years general counsel of the Pittsburgh Coal Co., principal complainant in the pending lake cargo case.

The Woods nomination is likely to start a new contest between the White House and the Senate over appointments. Opposition to the Woods appointment comes from all the coal states except Pennsylvania because of the contest of producing fields in the lake cargo coal cases.

The Senate Interstate Commerce Committee is sure to go into Mr. Woods' part in the Pennsylvania primaries. Between this and the coal-state opposition the President will be in the same position on the Woods nomination that he was on that of Commissioner Thomas F. Woodlock of New York, who was turned down, then given a recess appointment and later confirmed.

Senator Reed of Pennsylvania opposed the Woodlock confirmation. He declared warfare on the administration unless Pennsylvania was given recognition.

It is understood that Senator Reed was given assurance that Pennsylvania would get a place, and he demanded the Cox vacancy. Commissioner Cox was strongly supported as an able member of the Commission.



L. E. Young

Chosen vice-president in charge of operations of the Pittsburgh Coal Co.

### Wage Revision Continues In West Virginia

The Brady Warner Coal Corporation of Morgantown, W. Va., posted notices on Dec. 18 announcing a 20 per cent cut in wages effective the following Monday. The Brady-Warner company operates two mines in Monongalia County. Similar reductions were announced at the same time by the Continental Coal Co., operating two mines at Morgantown and one at Parkers Run, and by the Fairmont-Cleveland Coal Co. This is taken as a forerunner of a general cut for the miners employed in non-union fields of the district. The wages of non-union miners were increased some time ago during a fluctuation of the coal market.

The Brady Coal Co., at Mabie, W. Va., is operating now on a scale lower than that in effect since Nov. 1. For a time the company shut down its mine following a drop in price, but with wages adjusted to conform to prevailing prices, the company is active again, and expects to operate regularly.

Reductions in wages in the western Pennsylvania coal and coke regions, which were expected soon after the British strike showed signs of collapse and sagging tendencies appeared in the Pittsburgh market, have failed to materialize. It is now considered likely that no definite action in that direction will be taken by the operators until the wage question comes up for consideration between union operators and their employees.

When it was definitely stated recently on behalf of prominent Connellsville operators that wage reductions would not be considered before Jan. 1 there was an interpretation that this meant that scales probably would be reduced at that time.

It is clear, however, that no such conclusion was justified. Leading interests are strongly opposed to wage reductions in the near future, which naturally means that nothing would be done until after the adoption of a union scale for the period beginning April 1.

### Field Resigns Presidency Of Pittsburgh Coal Co.; Morrow Named New Head

J. D. A. Morrow, vice-president in charge of sales of the Pittsburgh Coal Co., on Dec. 22 was elected president and director of the company to succeed W. K. Field, who had presented his resignation earlier the same day. The board also announced at the close of the meeting that the resignation of Mr. Field, on account of ill-health, was accepted with regret. His retirement is effective Jan. 1, when Mr. Morrow will take office.

J. B. L. Hornberger, vice-president and comptroller, was elected a director and chairman of the executive committee. L. E. Young, of St. Louis, vice-president and general manager of the Union Collieries Co., a subsidiary of the North American Co., was elected vice-president in charge of operations.

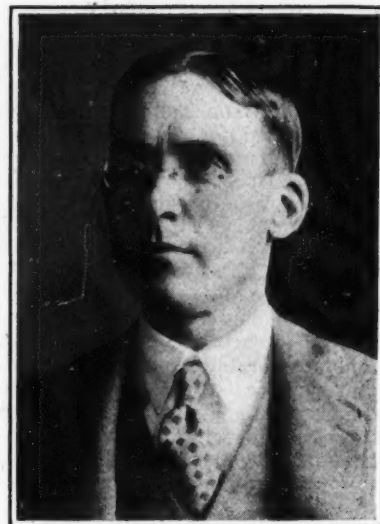
W. K. Field, who has just stepped down, has long been recognized as an outstanding figure in the bituminous coal industry of the United States. He began his business career 42 years ago as a car clerk with the Scioto Valley R.R., now the Hocking Valley, at Columbus, Ohio. Shortly thereafter he left the railroad and became a coal salesman for the Sunday Creek Coal Co. of Ohio. For a number of years he had charge of the Sunday Creek Coal Co.'s dock interests in the Northwest, with headquarters at Minneapolis. He went to Pittsburgh in 1906 as vice-president of operations of the Pittsburgh Coal Co., a few years after the formation of that company. In 1908 he returned to Columbus as president of the Sunday Creek Coal Co. In 1910 he returned to Pittsburgh to take command of the Pittsburgh Coal Co., then the largest bituminous coal company in the world.

#### Advice Sought During War

For sixteen years Mr. Field was a prominent figure, during a period in which the soft-coal industry was faced with many crises. Mr. Field's advice was eagerly sought during the World War years, when high-speed production of coal was vital to the success of the struggle. Mr. Field has commanded the confidence and respect of warring forces in the industry, coal miners and conflicting operators alike recognizing the sincerity of his purposes.

Mr. Field was the first president of the National Coal Association when that body was organized in 1917, and during the war was a constant adviser to Dr. H. A. Garfield, U. S. Fuel Administrator. Since 1910 he has been a member of practically every scale committee representing the operators of the Central Competitive Field in meetings with the United Mine Workers for the adjustment of wages. As president of the Pittsburgh Coal Co. he led the fight for more equitable freight rates for the Pittsburgh district, and won the first decision in 1912 when the Interstate Commerce Commission reduced the Pittsburgh rate 10c. to the Lakes.

The consolidation of the Monongahela River Consolidated Coal & Coke Co. with the Pittsburgh Coal Co. was effected in 1916 under his direction,



J. D. A. Morrow

Who assumes the office of president of the Pittsburgh Coal Co. as successor to W. K. Field on Jan. 1.

thus bringing under one management the largest group of bituminous coal mines in the country.

Mr. Young is a graduate of the Pennsylvania State College and after graduation became director in charge of the Rolla School of Mines, Rolla, Mo., and for a number of years was associated with the Colorado School of Mines. For several years he also was associated with the U. S. Geological Survey. Eight years ago he was placed in charge of the development of the steam-heating department of the Union Electric Light & Power Co. and later became general manager of the Union Colliery Co., Dowell, Ill., a subsidiary of the Union Electric.

### Fireboss Fined and Jailed In Mine Blast

Charles Treneary, of Nanticoke, Pa., fireboss at the No. 7 colliery of the Susquehanna Collieries Co., at that place, where an explosion killed nine men about a month ago, was sentenced on Dec. 27 to pay a fine of \$500 and costs and to serve three months in the county jail. In imposing sentence, Judge William S. McLean said that the mine laws for the safety of workmen must be obeyed to the letter by every official and employee. Treneary admitted that he had failed to inspect the section of the mine in which the explosion occurred.

### More Open Tops Ordered

An order for 500 hopper cars has been placed with the Standard Steel Car Co. by the Lehigh Valley R.R.

The Western Maryland Ry. has awarded a contract to the Baldwin Locomotive Works for 20 heavy freight locomotives for delivery early in 1927.

The American Bridge Co. has received a contract from the Carnegie Steel Co. for the construction of 30 standard steel coal barges.

The Mobile & Ohio R.R. is inquiring for 200 gondolas and 150 hopper cars.



## Scattered Car Supply Hampers Rehabilitation Of British Coal Industry

Disorganization of the coal-car supply in Great Britain is one of the important factors delaying an immediate resumption of normal activity in the coal-mining industry as well as in the iron and steel trades and their dependent industries, states a report to the Department of Commerce from Assistant Trade Commissioner Harold A. Burch, London.

The majority of the miners have now resumed work, after a stoppage of seven months; blast furnaces, rolling mills, machine shops, woodworking plants, etc., are being restarted, and reports show that accumulated orders may be sufficient to keep most British industries occupied for several months after domestic coal supplies are again fairly plentiful. Meanwhile, reserve stocks of coal held by industrial plants and public-utility companies are low, the present price of coal is tending to restrict consumption, imports of coal purchased at high prices have not yet stopped, and the coal mines cannot continue to produce coal unless cars are available to transport the coal raised.

### Car Shortage May Last 6 Months

According to reports in England, British industry may be faced with a coal-car shortage for as long as six months.

It is estimated in the United Kingdom that approximately 60 per cent of the coal cars are owned by private colliery companies; the remaining 40 per cent are owned by the railway companies and are termed "common user," which means that if one railway company delivers 100 cars loaded with coal to another railway company the receiving company must return 100 empty cars for those received.

Moreover, the coal-car equipment of the country is only sufficient to meet normal requirements, yet the demand will be abnormal over the next six months, in order to satisfy the increased consumption and build up reserve coal stocks.

Following the termination of coal mining in the United Kingdom coal began to be imported at the rate of about 1,000,000 tons per week, and this had to be distributed throughout the whole of Great Britain. Normally, coal cars move from pit to port, or from pit to industrial areas, a distance of 10 to 40 miles. During the emergency many of these cars were loaded at the ports and dispatched to all parts of the country, unloaded, and then sent to the nearest port or stabled in the nearest available siding.

The railways are endeavoring to sort out the idle equipment and marshal it into position, so that the colliery companies may have an available supply to draw upon, but it is said in England that their efforts will not prove effective unless traders and coal merchants release equipment quickly and unless there is no hold-up of cars at the ports. Limited siding space available at the collieries may also have retarding effects, as it is necessary in some cases that cars be stabled at considerable distance from the pits.

## German Plant to Extract Oil from Coal

The erection of a large plant in Germany for the purpose of extracting oil from coal is reported in the German press, according to advices from Berlin. The new plant is being erected by the I.G. (German chemical trust) contiguous to the Leunawerke, at Merseburg.

The new "oil from coal" plant, it is said, will embrace 23 new large buildings including the firing plants. In ten of these structures the fine coal and dust coal (lignite) will be liquefied. Special apparatus will be employed to recover hydrogen. The liquid coal and hydrogen will be combined in the firing plants under high pressure. Fifteen large tanks will be provided to store the product resulting from the operation of this process, it is reported.

The construction projects calls for completion within one year, according to reports. In addition to the "oil from coal" plant the Leunawerke also is constructing a new calcium nitrate plant, two gas tanks, each of 2,800 cubic meters capacity, new silos and a new cooling tower. Six thousand workmen are said to be employed in the building projects of the concern in addition to the personnel, numbering 10,000 already employed there.

## Heavy Storm Causes Floods In Mining Regions

A steady, heavy rainfall last week which continued for thirty-six hours resulted in flood conditions over much of eastern Kentucky and some parts of western Kentucky. Streams overran their banks, some coal mines were flooded, towns were inundated, bridges cut, and railroad movement seriously interfered with. Telephone service to many coal towns was interrupted and even telegraphic connection was poor.

Pineville, Harlan, Hazard, Barbourville, Beattyville, Jackson, Whitesburg and other points reported considerable trouble, most of the headwaters territory of the Kentucky River being flooded.

Among the mines affected in eastern Kentucky was one at Gray's Knob in Harlan County, where 75 ft. of the Louisville & Nashville R.R. track was washed out. Two mines near Hazard also were sufferers from washouts and reports from there indicated that several miners' houses had been swept away by the rising waters of the creeks.

Tug River was on a rampage in the Williamson region of West Virginia Dec. 22. Many houses at Coalwood, McDowell County, seat of the operations of the Consolidation Coal Co., were inundated and occupants had to move out. At Eckman and at Bottom Creek there was more water in the mines than ever before. Deegans mines, in McDowell, also were flooded.

More than 1,000 miners in Walker County, Alabama, were thrown out of employment temporarily as a result of the flood.

## More Coal Mergers Planned In South Wales

An agreement is reported to have been reached whereby the firm of L. Gueret, Ltd., will absorb Llewellyn, Merrett & Price, Ltd., and a new company will be formed to amalgamate the interests of these two firms and their associated companies. It is reported in England that the new company will control the major part of the patent-fuel output in South Wales as well as a production of several million tons of coal annually.

It is estimated in British coal circles that this merger, together with the recently announced amalgamation of Ocean Coal & Wilsons, Ltd., and the United National Collieries, Ltd., will bring approximately one-fourth of the present production of South Wales under the direction of the two companies.

These mergers, together with those recently announced in South Yorkshire, are of particular interest in connection with the recommendation of the Royal Coal Commission and the later recommendation of the majority report of the Departmental Commission on co-operative coal selling to the effect that the concentration of the British coal industry into a smaller number of units would be beneficial to the industry.

Directors of Amalgamated Anthracite Collieries, Ltd., and of United Anthracite Collieries, Ltd., have provisionally agreed to a merger of the two companies, whose properties are in South Wales. The capital of the amalgamation will be £4,445,014. Sir Alfred Mond, M.P., will be chairman of the merged companies, and F. A. Szarvasy, the present chairman of United Anthracite Collieries, Ltd., will be deputy chairman.

The two companies have twenty collieries, with a combined area of more than 22,000 acres. The Amalgamated Anthracite Collieries also is joint owner with the Weaver Coal Co., Montreal, of the Canadian Welsh Anthracite Co., organized to market in Canada a substantial tonnage of Welsh coal.

Official confirmation has been received of a merger of the Ocean Coal & Wilsons, Ltd., and the United National Collieries, Ltd., both of South Wales, by which the former company acquires control of the latter through a purchase of shares.

Ocean Coal & Wilsons, Ltd., was registered in 1908, and owns entire share capital of Ocean Coal Co., Ltd., Cardiff, with collieries in South Wales producing about 2,500,000 tons annually of household, manufacturing and steam coal, and also owns the whole share capital of Wilson, Sons & Co., Ltd., London, a long established firm of coal depot proprietors, lightermen, etc. United National Collieries, Ltd., Cardiff, are proprietors of a number of collieries in Glamorganshire and Monmouthshire, with a total annual output of about 1,350,000 tons of coal.

The new company will have control of some fifteen collieries, the output of which will be sold through the Ocean Coal Co. and Wilson, Sons & Co., Ltd. The capitalization of Ocean Coal & Wilsons, Ltd., stands at about £7,000,000, and of United National Collieries, Ltd., at about £1,600,000.

### Accidents at Coal Mines In November Killed 211; 11 Months Rate Declined

Accidents at coal mines in the United States in November, 1926, resulted in the loss of 211 lives, according to information received from state mine inspectors by the U. S. Bureau of Mines. Forty-two of these fatalities occurred at anthracite mines in Pennsylvania; the remaining 169 were at bituminous mines throughout the country. As the output of bituminous coal in November was 59,721,000 tons, the fatality rate for the month for this branch of the industry was 2.83 per million tons, as compared with 3.43 for November a year ago. The anthracite rate for November of the present year was 5.64; no corresponding rate is available for November, 1925, because of the strike among the miners.

The November fatalities brought the total number of deaths at all coal mines during the first eleven months of 1926 to 2,239 as compared with 2,029 during the same period last year. Based upon a production of 598,091,000 and 529,122,000 tons of coal the fatality rates were 3.74 and 3.83 respectively for these periods.

An explosion at Moundsville, W. Va., on Nov. 15, in which 5 lives were lost, brought the total number of major disasters—that is, disasters causing the death of 5 or more men—during the first eleven months of 1926 to 15, with an aggregate loss of 312 lives. During the corresponding months last year 11 similar disasters occurred with a loss of 204 lives. The per-million-ton death

### Loads Heavy Tonnage In Twelve Days

Steve Lane, an employee of the Buckhannon River Coal Co., at Adrian, W. Va., loaded 350 tons of coal, equivalent to seven railroad cars, in the last half of November. He received \$210 for his labor.

The Buckhannon River Coal Co., operates the upper Freeport seam, which has an average thickness of 5 ft. 8 in. from roof to pavement. Approximately 14 in. of impurities must be removed from this coal before it is loaded into mine cars. This employee therefore loaded the above stated tonnage from a seam 4 ft. 6 in. thick, which is a record breaker in this section for any coal loader in twelve working days.

rate, based exclusively on these major disasters, was 0.52 for January-November, 1926, as compared with 0.39 for the same months of 1925.

An examination of the causes of the accidents in 1926 shows a reduction in falls of roof and coal, explosives and electricity, but a slight increase in haulage and gas or dust explosions. The comparative rates per million tons were:

	Year 1925	Jan.-Nov. 1925	Jan.-Nov. 1926
All causes.....	3.811	3.835	3.744
Falls of roof and coal	1.842	1.892	1.782
Haulage.....	.615	.622	.654
Gas or dust explosions	.590	.541	.637
Explosives.....	.174	.180	.139
Electricity.....	.144	.151	.145

### Polish Coal Mines Adopt Scientific Methods

Wallace Clark, consulting engineer, New York, in discussing the paper, "An Experiment in Scientific Management in the Coal Mining Industry" before a joint meeting of the American Society of Mechanical Engineers and the Taylor Society on Dec. 9, in New York City, said that America was not alone in considering scientific methods of management in the coal-mining industry. In the mines in Poland, he said, work was being planned and scheduled ahead of time and the actual performance was then checked against the scheduled work. Also, said Mr. Clark, much work in Poland was done alone to time standards. Operations were studied for time necessary and from these studies time standards were set for jobs. The management in the Polish mines had made many job analyses and work was being done according to standards.

The result, according to Mr. Clark, has been an increase in production per man and in the case of non-productive work a decrease in the cost of such work because of an increase in the amount of work done per man. Mr. Clark made many citations from company records showing the class of work done and the results.

The Baltimore & Ohio R.R. has asked the Interstate Commerce Commission for permission to lease the Indian Creek Valley Ry., a 27-mile line extending from Indian Creek to Blair Mine, Pa.

### Coal-Mine Fatalities During November, 1926, by Causes and States

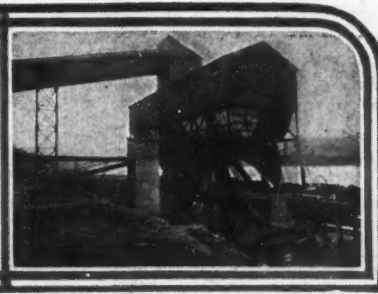
(Compiled by Bureau of Mines and Published by Coal Age)

State	Underground											Shaft				Surface						Total by States				
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Explosions of gas and dust.	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Care, skip or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1926	1925
Alabama.....	4		2				3					9													9	7
Alaska.....																									0	0
Arkansas.....																									0	1
Colorado.....	1	1										2			1			1							4	4
Illinois.....	9		6	1				1				17	1					1							18	15
Indiana.....			2									2													2	3
Iowa.....	2			2								4													5	2
Kansas.....	1											1			1										2	0
Kentucky.....	7		3									10								1			2		12	28
Maryland.....																									0	2
Michigan.....																									0	1
Minnesota.....		1										1			1										2	1
Montana.....	1											1													1	0
New Mexico.....																									0	1
North Dakota.....																									0	2
Ohio.....	3		2									5											1	1	6	12
Oklahoma.....	1			1			1					3													3	0
Pennsylvania (bituminous).....	27	3	8		1				1		1	41						1				1	1	3	44	28
South Dakota.....																									0	0
Tennessee.....	2		1									3													3	1
Texas.....																									0	1
Utah.....	1											2													2	3
Virginia.....	4		2									6													6	4
Washington.....			2									2													2	4
West Virginia.....	20	3	8	5	3		2					41						2					4	6	47	49
Wyoming.....	1											1													1	4
Total (bituminous).....	84	8	36	9	4		7	1	1			151	1		3		4	4		2		2	6	14	169	173
Pennsylvania (anthracite).....	13	4	4	1	9	1					5	37			1		1	2				2	2	4	42	4
Total November, 1926.....	97	12	40	10	13	1	7	1	1		6	188	1		4		5	6		2		2	8	18	211	
Total November, 1925.....	95	6	31	9	7	1	9	1	4		3	166	1			2	3	2		1		1	4	8		177





## News Items From Field and Trade



### ARKANSAS

**To Push Rescue Work.**—Instruction in mine rescue work and in first aid is being given coal miners in the Arkansas fields, according to W. D. Ryan, of the U. S. Bureau of Mines, Kansas City, Mo., working in conjunction with Claude Speegle, Arkansas State Mine Inspector. A mine rescue car containing equipment for rescue work, which recently arrived at Fort Smith, will visit most of the state's coal fields.

**Arkansas Output Slumps.**—Coal production in Arkansas during the fiscal year ending June 30 last decreased 100,000 tons, according to the annual report of Claude Speegle, State Mine Inspector. A total of 1,293,102 tons was mined this year, according to the report. Mr. Speegle valued this year's production at \$5,243,698. Several small wagon mines did not report their tonnage. Of the 144 mines, 106 were in operation. A total of 3,819 men was employed. The average working period of 137 days was longer than 1925. Some of the largest mines did not operate.

### COLORADO

**Union Interest Spreading.**—A revival of interest in unionism which has been sweeping the southern Colorado coal fields has been manifested strongly in the northern part of the state recently in a series of meetings held under the direction of O. F. Nigro, president of District 15. Regular Thursday night meetings are to be held from now on at Louisville.

The State Coal Mine Inspector's report shows production for November of 1,180,000 tons, compared with 1,167,000 tons in the same month a year ago, an increase of 13,000 tons. Total production for the first eleven months of the current year was 9,272,000 tons, which is an increase of 102,000 tons over the corresponding period a year ago.

### ILLINOIS

Fifty years of continuous operation of the Peabody Coal Co. mines in Christian County was predicted following the recent announcement of the purchase of 484 acres of coal lands in South Fork Township. Coal operations in Christian County will be extended to its furthestmost edge through the recently acquired tracts. Fear that the mines would be worked out in five or

ten years have been allayed by the announcement.

Coal-mine tipples, shafts and chutes must all be of fireproof material to comply with the Illinois mining laws, Attorney General Carlstrom has advised A. D. Lewis, Director of the State Department of Mines and Minerals. The inquiry grew out of a proposal of the owner of the South Mine Coal Co., at Carlinville, to cover a wood chute with sheet metal.

**Month's Output 7,900,479 Tons.**—Illinois mines produced 7,900,479 tons of coal in November, an increase of 1,323,533 tons over November, 1925. Of this total, 1,844,500 tons came from Franklin County operations. The nineteen mines in the county employ between 11,000 and 12,000 men.

**Take On 350 Miners.**—The Taylor-English mine at Catlin has opened for work again and more than 350 of the men who were laid off in 1924 have returned to work. When the mine was closed there were more than 700 employed. According to Benjamin Taylor, president of the corporation, the mine will remain at work for an indefinite period.

**Union Officers Re-elected.**—Official returns of the recent election of officers of District No. 12 of the United Mine Workers (Illinois) received at the headquarters in Springfield, indicate that all of the old officers have been re-elected by large majorities. They are: President, Harry Fishwick, Springfield; vice-president, William J. Sneed, Herrin, and secretary-treasurer, Walter Nesbitt, Belleville.

The Saline Coal Corporation has announced the resumption of work at its No. 6 mine, located at Grayson, idle the past year. The mine employs 300 men. There will be eighteen coal mines at work in Saline County, with 3,300 men employed, with the opening of this operation.

### INDIANA

**Rock-Dust Bill Coming.**—The state mining board will hold another meeting soon, when it is expected to prepare another rock-dusting bill and agree on other safety legislation for the protection of miners. The measure will be presented at the session of the Legislature which begins after the first of the year. According to William Mitch, secretary of District No. 11, United Mine Workers, and a member of the board, a rock-dusting bill was passed by both houses of the Legislature at the

last session, but became lost somewhere between the legislative chambers and the Governor's office and therefore did not become a law.

**Output Up 27 per Cent.**—Coal production by Indiana mines in November was 2,469,979 tons, an increase of 27 per cent over the preceding month, when the total was 1,947,526 tons. In November, 1925, the output was 1,841,881 tons. The number of mines in operation last month was 128, a gain of 27 over October. Working time advanced from 71.14 per cent to 77.62 per cent of full time.

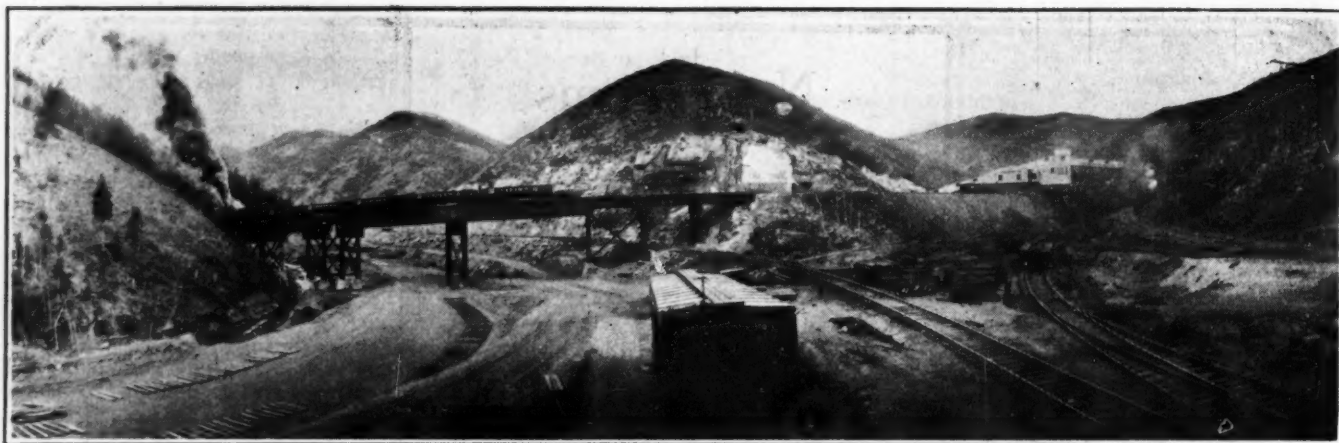
Edwin D. Logsdon, president of the Knox Consolidated Coal Co., Indianapolis, recently purchased a piece of business property in the downtown business district of Indianapolis valued at \$130,000.

The Gladstone coal mine, three miles east of Petersburg, heretofore operated by the Klinck, Mitchell & Bach Co., of Linton, has been sold to the DeLuxe Coal & Coke Co., a retail organization. The mine has a capacity of 400 to 500 tons daily and employs about 100 men. Charles W. Kirk will continue as mine superintendent.

**Assails Failure to Rock-Dust.**—Hazardous conditions in the Francisco Mine No. 2, where a recent explosion cost 37 lives, are duplicated in practically every coal mine in Indiana, according to a recent declaration by G. T. Powell, Evansville, U. S. mine inspector. Mr. Powell was reminded that since the Francisco disaster, miners have expressed fear of other mines in the southern part of Indiana. "I don't blame them," he declared. "These mines are filled with coal dust and because there is no state law compelling the rock-dusting of the mines, the conditions remain. We need state legislation to protect the Indiana miners."

Articles of incorporation for the Red Shaft Coal Company, with a capital stock of \$10,000, have been filed in the County Recorder's office at Evansville, Ind. The company will take over the holdings of the Sargeant Coal Co. at Newburgh, Ind. The Sargeant company owns a large mine, which recently resumed operations after a shutdown of several months. The incorporators of the new company are Chester P. Mullins, Mary J. Wilson, Margaret Mullins and Thomas C. Bugg. The new company will have its headquarters at Evansville.

**After Mine Bosses' Scalps.**—As a protest against alleged action of mine



**Top Works of Consumers Mutual Coal Co.**

The company operates in the new Gordon Creek coal district, Carbon County, Utah. On the right is the 4000-ton tipple. To the right of the tipple is the No. 1 mine. On the left of the tipple is No. 2 mine. Both mines are working on No. 1 seam, 9½ ft. in thickness. The company also has 13 ft. and 12 ft. seams. The

two-track steel bridge and trestle in the picture is owned by the coal company, and is part of its car-storage system. The railroad line going underneath the bridge is the main line of the National Coal Ry., which is now being operated under the control of the Utah Railway.

bosses in not notifying workmen in the mines in southern Indiana when Francisco mine No. 2, in Gibson County, was blown up recently and a number of miners were killed and a score injured, the men at the Gudgel mine, near Oakland City, have demanded the discharge of their mine boss. Upon refusal of their demands the miners voted to remain out until their request had been granted. It is understood that similar action was taken by the miners at some of the other mines in the southern Indiana field.

## OHIO

### Seek Motor Truck for Rescue Work.

—The Ohio Department of Mining is planning to abandon the railroad mine rescue car "Black Diamond" and replace it with a motor truck, if the necessary appropriation can be obtained from the Legislature. Roads in all sections of the state have been improved to such an extent that practically every mine can be reached on a hard-surfaced road and it is believed that much better service could be given by the use of a motor truck. At the regular yearly meeting of the deputy mine inspectors held in Columbus last week this and other important matters were discussed. Recommendations for amendments in the laws governing safety in mines will be made to the Legislature, which will convene early in January.

**Launch Co-operative Venture.**—Owners of coal lands in the Black Diamond district, east of Glouster, are organizing a co-operative mining concern to mine coal in a small way. They are interesting miners in the venture and are leasing their properties on a royalty basis. Several of such mines have been opened recently.

**Drive Deep Mine on Large Tract.**—The Ohio & Pennsylvania Coal Co., of Wheeling, W. Va., is developing one of the largest mines in Ohio and the second deepest shaft mine in the state on a tract of about 9,000 acres three miles southeast of Cadiz. The company will operate in the middle Kittanning seam,

which ranges from 6 to 8½ ft. thick. The shaft, which will be 460 ft. deep, is being put in and both the main shaft and the airshaft are down more than 300 ft. The latest equipment in the way of cutting and loading machinery and tipple equipment will be installed. The most modern safety appliances, including rock dusters and closed lights, will be used. The capacity of the mine when completely developed will be between 7,000 and 8,000 tons daily. It is expected that the mine will not be ready for operation until some time late in 1927.

**Reilly's Competitors Withdraw.**—The tie in the election of the fourth director of the Cincinnati Coal Exchange was broken Dec. 21, when W. I. Donnelly and R. P. Gillham resigned all claim to election and gave the honor to Jim Reilly, former president of the Chamber of Commerce and called the "Stepfather of the Coal Exchange."

**Coal Men Play and Sing.**—The Christmas party held by the Cincinnati Coal Exchange on Dec. 21 at the Hotel Alms was attended by over 200 members and guests. The ladies were provided with favors and 35 presents were given to various members "for good behavior." Besides professional entertainers a jazz band led by Harold Tildesley, of the Tildesley Coal Co., and composed of Armour Sizer, Bob Dickson, Elmer Wierhake, John Glaser, Bob Gruesser and Frank Weisenfelder, provided entertainment. Judge Joe Tuohy was Santa Claus. George Freeman Kelly, "broadcaster" for the Houston Coal Co., sang "When You and I Were Young, Maggie."

## PENNSYLVANIA

The Barking mine of the Hillman Coal & Coke Co., at Barking, near Pittsburgh, has been closed down after being in operation less than two months. The mine had been closed down 18 months prior to the reopening.

**Await Terminal Report.**—The Pittsburgh Terminal Coal Corporation is expected to show substantially better earnings in the present quarter than

in the quarter ended Sept. 30, when net profit of \$33,472 after depreciation and depletion, but before federal taxes, was reported. The sharp upturn in prices in October resulting from foreign demand and high rate of industrial activity afforded a much broader margin of profit than at any previous time this year.

**Receivers for the Oliphant Coal & Coke Co.** will sell the property of the company in Fayette County at public sale Jan. 8. A tract of 230 acres of Sewickley coal and two mines, with equipment, are included.

**Agree to End Cave-ins.**—Robert Barron, president of the Barron Coal Co., of Scranton, has entered into an agreement with officials of the City of Scranton designed to prevent further mine-cave damage by the company's operations. Several properties in the South Scranton section were damaged by surface subsidences above the Barron operations in the past few months.

**Heavy Damage in Tipple Fire.**—Fire which broke out Dec. 21 in the McClane tipple of the McClane Coal Co., near Washington, Pa., caused damage estimated at \$350,000. Although the company's mines, which employ more than 250 men, have been under guard for some time, because of unrest among the miners, W. H. McClane, president, said he did not believe that the blaze was of incendiary origin.

**Central Field Output Up.**—Coal output in the central Pennsylvania field this year will approximate 48,700,000 tons, estimating for the remainder of the year. This is an increase of 5,000,000 tons over last year and 9,000,000 tons over 1924.

**May Not Confirm Golden.**—There is nothing to indicate that the appointment by Governor Pinchot of Christ Golden as a member of the Public Service Commission will be confirmed by the State Senate. Golden probably has the support of many union miners back of him, but it is said that labor as a whole is not greatly interested in his retention on the commission. The names of the seven anthracite inspectors recently appointed by the Governor also will be sent to the Senate for confirmation.



## VIRGINIA

A certificate of authority has been issued by the Virginia State Corporation Commission to the Blue Diamond Coal Co., of Delaware, to mine and sell coal in the State of Virginia. The principal office in Virginia is to be located at Bonny Blue, with J. B. DuPuy in charge. The company has \$5,500,000 capital. Robert S. Young, 1000 Burwell Building, Knoxville, Tenn., obtained the certificate.

The American steamer Chilore, operated by the United States Shipping Company, cleared recently from Norfolk for Cristobal with a cargo of 20,050 tons of coal. The ship is the largest loading at Hampton Roads. She is an oilburner and her cargo is consigned to the Panama Railway Co.

**Wakenva Operations Expand.**—The Wakenva Coal Co., in southwest Virginia, has just obtained a lease of the Hardaway tract lying at the head of Roaring Fork of McClure River, near DeBusk, and will start operations there at once. The Hardaway property is so situated that the Wakenva company can, by driving a tunnel from its No. 2 mine at Trammel, mine the coal and dump it over the new steel tippie at the Trammel plant. The Wakenva company also has leased the Clinchfield Coal Corporation's property at the mouth of Roaring Fork and will build a number of houses for the accommodation of the workmen to be employed in the new mines.

**To Add Storage Tracks.**—The Norfolk & Western Ry. has begun construction of an extension of its coal car storage track facilities at Lamberts Point to give accommodation for an additional 1,000 coal gondolas, W. H. Johnson, general agent of the system at Norfolk, has just announced. Outlay of \$250,000 for the improvement has been authorized, and the track will be all laid early in the new year. There is now storage space for between 5,000 and 5,500 coal cars at Lamberts Point, Mr. Johnson said. During the British coal strike, when the coal movement was at its highest, it was impossible to maintain an adequate reserve at Lamberts Point, coal being dumped into ships as rapidly as it was received from the mines.

## WEST VIRGINIA

**Smith Acreage Sold.**—Eighteen hundred acres of coal land, the property of the estate of the late Mortimer W. Smith, Sr., on Coburn's Creek in Harrison County was sold for \$70,000 at court sale at Clarksburg last week by Harvey W. Harmer, special commissioner. A. J. Fletcher representing the Empire National Bank, the Farmers Bank, the Union National Bank and the Merchants National Bank, all of Clarksburg, was the purchaser.

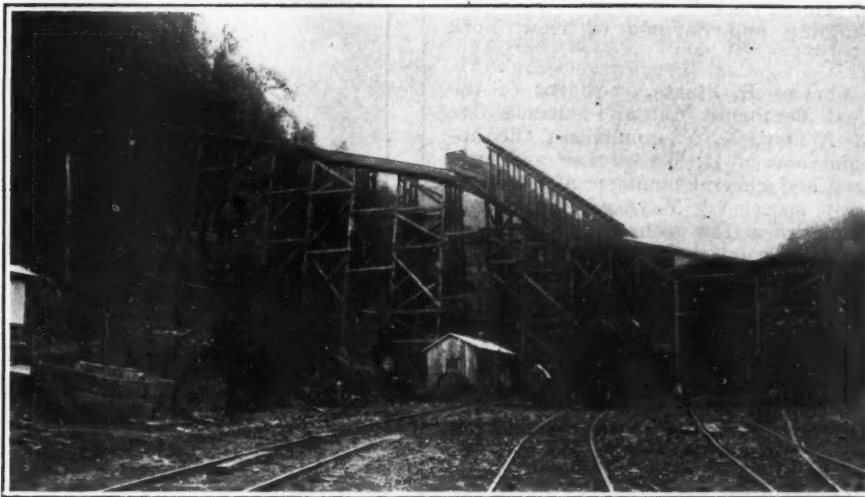
The last oven at the Semet-Solvay Company coke plant at Benwood in Ohio County has been emptied and the plant closed down for the time being. Orders were received by Superintendent A. N. Nickerson at the Benwood plant

from the New York office. The by-products plant where coal is converted into coke and more than 100 chemicals are retained has operated all of the 120 ovens at the plant since last summer. The coke is manufactured primarily for the two blast furnaces of the Riverside plant. When the Riverside plant was shut down more than a year ago, operations were also suspended at the coke ovens. Resumption at the coke plant last summer was explained at that time as being due to a commercial domestic demand for coke. Nearly 100 employees are affected.

**Urge Drastic Mine Laws.**—All of the mine inspectors of West Virginia with a single exception were in Charleston Dec. 18 for a conference with R. M.

fixed but some years ago stockholders voted permission to the management to buy in for treasury account its preferred stock at any price up to \$105 a share. The company finishes the year with net current assets of \$8,000,000, of which \$5,000,000 represents U. S. Liberty bonds and \$2,000,000 cash. The management has been long trying to evolve a plan for the elimination through retirement of the preferred stock, which is non-callable.

The McDowell County Mining Institute was organized Dec. 16 at a meeting in Welch, W. Va., and officers were elected to handle the affairs of the organization. The purpose of the institute is to eliminate mine accidents. H. B. Morgan, superintendent of the



Monitor Dumping at the Tippie of the High Splint Mine, in Kentucky

The monitor incline is 2,900 ft. long and the difference in elevation is 1,500 ft. The coal from this mine resists breakage so well that in spite of the handling by 15-ton barrel monitors the amount of lump over a 4-in. screen averages 54 per cent. The mine is loading approximately 1,200 tons per day. In order to get away from the expensive maintenance of the high wooden trestle it has been proposed to move the dumping bin to the hillside and install a conveyor from there up to the screens.

Lambie, head of the state department of mines, to consider legislation to be proposed at the approaching session of the Legislature. Attention also was given to the formulation of preliminary plans for the convention of the Mine Inspectors Institute of America, which is to be held in Charleston next May. There was a lengthy discussion of proposed amendments to the state mining law covering violations of prudence in mining which are not sufficiently drastic under existing law. The 24 inspectors present expressed themselves as favorable to more drastic penalties for violations of certain phases of the mine laws.

A new record for coal loadings was set by the Norfolk & Western Ry. during the week ending Dec. 4, it has been announced at the general offices at Roanoke. During that time 20,302 cars were loaded. The best previous record for one week was set during the week ending Nov. 13, when 19,822 cars were loaded.

**Would Retire Preferred.**—Directors of the Island Creek Coal Co. have given authority to T. B. Davis, president, to purchase for retirement 10,000 shares of the nearly 50,000 shares of preferred stock outstanding. No set price was

Big Four Pocahontas Coal Co., was elected president; Bert C. Hylton, superintendent, Lake Superior Pocahontas Coal & Coke Co., first vice-president; Larry Holmes, Coalwood, second vice-president, and G. E. Daugherty, safety director, Kingston-Pocahontas Coal Co., secretary-treasurer.

Huntington has been named as the general headquarters of the newly organized Southern West Virginia Coal Co. which is to have its chief operations in Raleigh County, under the terms of a charter just issued. The company, however, will have other offices in Charleston and at Indianapolis. The company has been authorized to issue 130,000 shares of common stock of no par value. Incorporators of the new company are W. Dickson Cunningham, Vincent W. Quinn, H. George Carroll, John J. McGovern and John D. Schofield, all of New York. The company is authorized to hold 15,000 acres of land in West Virginia.

The New York Trust Co. has been designated as agent for the issuance of \$1,350,000 principal amount interim receipts representing West Virginia Southern Coal Co. first mortgage and leasehold 7 per cent gold bonds, due 1947.

## Among the Coal Men

W. H. Clingerman, president of the United States Coal & Coke Co., and of the H. C. Frick Coke Co.; J. W. Anawalt, president of the Union Supply Co., and other officials of the United States Coal & Coke Co. were visitors at Gary, W. Va., during Christmas week. They also visited the company mines at Lynch, Ky., and afterward went to Columbus, Ohio.

David Bellis, vice-president of the Comfort Coal-Lumber Co. of Hackensack, N. J., has been elected a director of the Franklin Society for Home Building and Savings of New York City.

Charles B. Staats, president of the Coal Merchants Mutual Insurance Co., of Albany, N. Y., announces the appointment of H. Walter Lee as secretary and general manager of the company, succeeding Maynard N. Clement, who died a few weeks ago. Mr. Lee has been counsel of the company. The Coal Merchants Mutual was organized in 1915 at the instance of the New York State Association of Coal Merchants to write workmen's compensation and public liability insurance.

Harry L. Englebright, Republican, California, has been appointed to the Mines and Mining Committee of the House of Representatives.

J. Craig Nelson, Norfolk (Va.) manager for the Central Pocahontas Coal Co., will leave that position Jan. 1 to become general sales manager for the Fort Dearborn Fuel Co., with headquarters at Norfolk.

A. G. Bailey, for many years Norfolk manager for Castner, Curran & Bullitt, Inc., and one of the best known shipping men in tidewater Virginia, will retire from that position Jan. 1, and his place will be taken by W. A. Howard, who has been assistant manager for a number of years. Mr. Bailey will devote his attention to other business enterprises in which he is interested. Mr. Howard, the new manager, has been associated with the company for 27 years, and is likewise well known to coal and shipping interests on the Atlantic coast.

Phil H. Callery, for many years attorney for the United Mine Workers at Pittsburg, Kan., and recently a Congressional candidate, recently announced that he would accept appointment as counsel for the Kansas State Federation of Labor, tendered him following an executive council meeting.

Scott Turner, director of the U. S. Bureau of Mines, has just returned to Washington from a tour of the experimental stations of the Bureau. Speaking of the station at the University of Washington, which is devoted almost entirely to coal, he said that commendable success had been achieved there in the washing of fine sizes of coal, it being possible to reduce the ash content nearly fifty per cent. Briquetting ex-

periments, dealing with fine sizes, also are being conducted at the station.

C. H. Jenkins, of Fairmont, W. Va., has announced that he has resigned as vice-president of the West Virginia Coal & Coke Co. and that he will ter-



F. M. Feiker

Recently elected to the newly created office of managing director of the Associated Business Papers, Mr. Feiker will assume the duties of his new post Jan. 1. His office will be at 52 Vanderbilt Ave., New York City.

minate his connection with the company about the first of the year. He will, however, retain his post as sales manager of the Hutchinson Coal Company, with headquarters in Fairmont. Mr. Jenkins has been in charge of the sales department of the West Virginia Coal & Coke Co., as well as of the sales department of the Hutchinson company, having accepted the post with the former company until its affairs were worked out definitely. R. C. Fitzgerald, of Cincinnati, has been appointed to succeed Mr. Jenkins.

Willett L. Wagner has been elected president of Guardian Coal & Oil Co., succeeding Davitt D. Chidester, of Philadelphia. Alfred Fritsche, vice-president of General Fire Extinguisher Co., was elected a director. Mr. Wagner formerly was vice-president and director of marketing of Pierce Oil Corp. and president and director of Brier Hill Collieries. With the change in the presidency stock control passes to the New York syndicate that has been in charge of developing properties in Webster County, West Virginia, and executive offices of the company will be moved to New York from Philadelphia.

J. R. Sheridan, purchasing agent for the West Virginia Coal & Coke Co., has gone from Fairmont, W. Va., to Cincinnati to take over the general purchasing department of the company in the Queen City.

## Traffic News

### I. C. C. Hears Oral Argument On Hard-Coal Rates

Final oral argument was heard in Washington Dec. 16 by the Interstate Commerce Commission on the proposal of anthracite carrying roads to increase the single-line rate on that commodity from \$2.65 to \$2.75 per ton, and to reduce the multiple line rate from \$3.02 to \$2.88 per ton on shipments from mines in Pennsylvania to Albany, Utica and Syracuse, N. Y. The present case is the outgrowth of a general investigation instituted by the Commission, following the coal strike of 1922, into the question of rates and regulations governing the transportation of anthracite.

H. A. Taylor and A. H. Elder, of the Erie R.R., presented arguments in support of the proposed rates on behalf of all Eastern roads. They justified the new rates by saying the roads felt they were fair, and the fact that there were both increases and reductions proposed would tend to give dealers with yards served only by multiple lines a better chance to compete with dealers with yards on the short single-line routes. No increase in revenues is expected to be derived by the carriers from the proposed adjustments, it was said.

Wilbur La Roe, counsel for the International Paper Co. and other consumers of coal, vigorously attacked the proposed scale, contending that the joint-line rate should be reduced to the single-line level. He called attention to the dividends paid by anthracite roads to show that they were financially able to reduce such rate and still leave their revenues but slightly affected. A reduction in the rate from the Wyoming district to Syracuse to \$2.53 per ton for both the single- and joint-line haul should be made, he declared.

F. C. Merritt, representing independent dealers at Kingston, N. Y., urged the Commission to require carriers to make equal rates on both single- and joint-line routes from all points of production in Pennsylvania to the Albany district.

The case was then submitted to the Commission for decision.

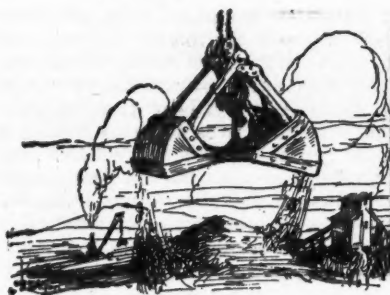
## Industrial Notes

The Buffalo Forge Co. and Buffalo Steam Pump Co. announce that beginning Jan. 1, 1927, their Philadelphia office, in the Land Title Bldg., will be in charge of W. S. Koithan and R. W. Pryor, Jr., who have for many years been joint managers of the New York office. They will continue to manage the New York district.

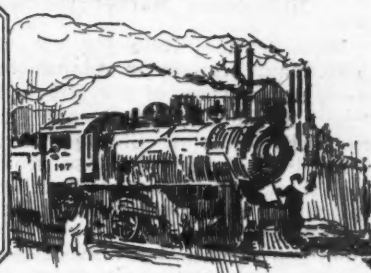
The Butte (Mont.) office of the Sullivan Machinery Co., of which James G. Graham is manager, has been moved from 48 East Broadway to 54 East Broadway.

The Electric Controller & Mfg. Co., of Cleveland, Ohio, announces the removal of its Toronto office from the Traders Bank Bldg., to 415 Metropolitan Bldg.





## Production And the Market



### Unsteady Prices, Erratic Buying and Heavy Output Mark Holiday Period in Coal Market

Barring unusually severe weather conditions with an attendant breakdown in transportation, the Christmas holiday period is one of dullness for the bituminous coal industry. The present time, with its adequate transportation service, is proving no exception to the general rule. Prices are unsteady, buying is erratic, production is uneven but at a high rate and more interest is expressed in what may happen after the turn of the year than in the duller day-to-day small-scale developments in individual markets or producing fields during the next few days.

Although the general level of spot prices declined slightly during Christmas week, the fluctuations as between different coals and between the same coals in different markets were such that the changes were indicative of no major trends. For the most part the variations were due to local conditions. Where the influences were broader in scope they could be attributed either to the weather or to the efforts of industrial purchasing agents to break a sagging market by withdrawing all buying support not dictated by absolute necessity.

#### Spot Levels Off 2c.

Coal Age Index of spot bituminous prices on Dec. 27 was 198 and the corresponding weighted average price was \$2.40. This was a decline of 2c. and 2 points from the figures for Dec. 20. Midwestern prices on domestic sizes were weaker and tidewater quotations

on some pools dropped lower. On the other hand, inland quotations on West Virginia coals, which have been bearing the brunt of the attack on prices since the collapse of the British strike, were, generally speaking, stronger.

Production during the week ended Dec. 18 was estimated by the U. S. Bureau of Mines at 13,220,000 net tons, as compared with 14,090,000 tons in the week preceding. The letdown in buying and the losses due to holiday celebration will mean a still sharper cut for the week ended Dec. 25. Nevertheless, cumulative output to Dec. 18 was 557,490,000 tons, as compared with 504,245,000 tons last year, 554,232,000 tons in 1923 and 557,095,000 tons in 1920. If the output for the year does not put 1926 in second place from the standpoint of production, the margin of loss will be very thin.

#### Wage Rates an Issue

Looking to the new year, the question of wages in the non-union fields is attracting the greatest general interest. Many groups of buyers seem bent upon forcing the non-union districts to revert to the bases in effect prior to Nov. 1. While some mines have made the reduction, others appear firmly set against any such action—at least prior to such time as the position of the union miners and union operators on the wage issue to be fought out, presumably in Miami, is definitely known.

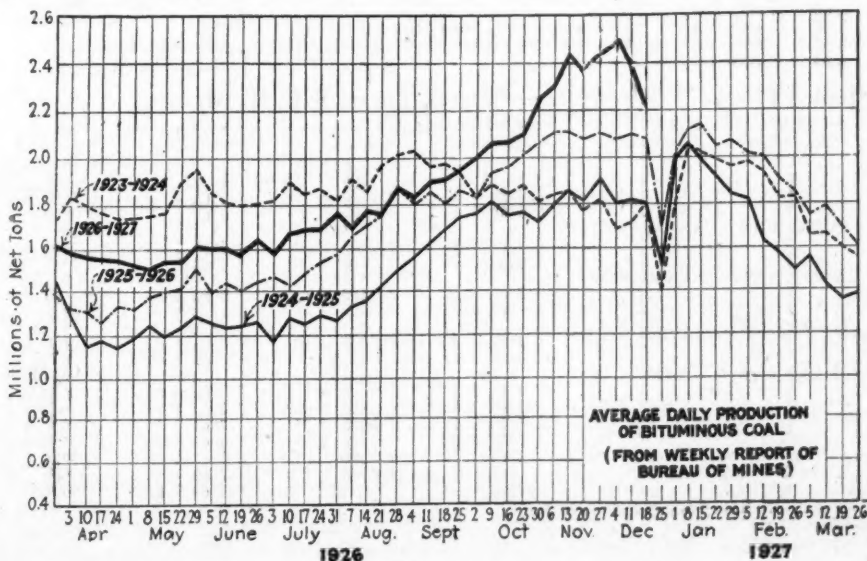
Second to this in general interest is the question of how much reserve

stocks were accumulated during the record production weeks of November and December. Upon the answer to this question will rest the course of the spot market during the next three months. Without a doubt there has been a marked augmentation of consumers' industrial coal stocks. How much the increase has been, however, cannot be quantitatively approximated until the publication of the next government stock survey.

#### Holiday Slump in Anthracite

The holiday slump in buying interest hit the domestic anthracite trade a hard blow. Egg, and even nut and stove, have been going into storage and operations have been curtailed to avoid further accumulations. Production during the week ended Dec. 18 dropped to 1,792,000 net tons. On the other hand, the shortened production had a favorable effect upon the movement of the steam sizes. No. 1 buckwheat showed more strength than it has for months and independent prices were firmer. Rice and barley also held their ground.

In the Connellsville coke trade, ovens and furnaces are beginning to discuss first-quarter contracts in a serious way. Some business, it has been revealed, has been closed at \$4@4.25, and independent ovens generally appear to be holding out for figures which will be in line with that basis, which covers wage advances made about Nov. 1. Pre-holiday production increased slightly at the furnace ovens.



#### Estimates of Production

(Net Tons)

##### BITUMINOUS

	1925	1926
Dec. 4.....	12,868,000	14,676,000
Dec. 11 (a).....	12,908,000	14,090,000
Dec. 18 (b).....	12,684,000	13,220,000
Daily average.....	2,114,000	2,204,000
Cal. yr. to date (c)...	504,245,000	557,490,000
Daily av. to date.....	1,695,000	1,873,000

##### ANTHRACITE

Dec. 4.....	63,000	1,997,000
Dec. 11 (a).....	64,000	1,802,000
Dec. 18 (b).....	56,000	1,792,000
Cal. yr. to date (c)...	61,657,000	82,373,000

##### BEEHIVE COKE

Dec. 4.....	298,000	191,000
Dec. 11 (a).....	288,000	184,000
Dec. 18 (b).....	313,000	183,000
Cal. yr. to date (c)...	10,214,000	11,201,000

(a) Revised since last report. (b) Subject to revision. (c) Adjusted to equalize number of days in the two years.





the marked slump in buying of the larger sizes has been unable to hold up the prices on slack. As a matter of fact, in the eastern Kentucky districts quotations actually have worked lower and western Kentucky operators have been compelled to pass up many orders because buyers would not pay the prices asked.

#### Labor Agitation Futile?

The labor situation in Kentucky is reported favorable by the operators. The reports of dissatisfaction of the workers and the revival of local unions are discounted or ignored. On the price side of the market, late quotations show eastern Kentucky block at \$2.50@3; 2-in. lump, nut and egg, \$2.25 up; slack, \$1.25@1.65. Lower prices, it is claimed, apply only on distress sales. Western Kentucky is holding 6-in. block at \$2.50@2.75; lump and egg, \$2.25@2.50; nut, \$2@2.25; mine-run, \$1.25@1.75, and screenings \$1.10@1.40.

Dock operators at the Head of the Lakes predict that December loadings of coal to the Northwest will exceed last month's total of 35,531 cars. Capacity operation still is the rule at most of the plants at Duluth and Superior. Notwithstanding the general opinion that there will be little coal carried over into next season, salesmen again are actively canvassing for bituminous orders. Smokeless grades are scarce. Anthracite trade is brisk. Quotations are unchanged.

Receipts at the docks during the navigation season ended Dec. 12 were the second largest in eight years. The total was 10,441,629 tons, of which 9,168,656 tons were bituminous and 1,272,973 tons were anthracite. Total receipts last year were 9,672,701 tons. In 1923 the docks received 12,688,321 tons. The 1926 movement is regarded with special satisfaction because the season was slow in getting under way.

#### Twin Cities' Demand Easier

Higher temperatures in the Twin Cities area had a soothing effect upon domestic consumer demand and the change was not unwelcome to the wholesale distributors. Both dock and all-rail quotations held firmly last week. At Milwaukee the market has settled back into a strictly weather affair, with no unusual features.

Listlessness characterized demand for prepared coals in the Kansas City market last week, but screenings were stronger, with most of the spot tonnage commanding the contract basis of \$2.35. Large accumulations of "no-bill" domestic sizes at the mines and liberal supplies in the retail yards have blunted the edge of wholesale buying even when, as was the case a fortnight ago, cold weather brought household consumers into the retail market.

There has been little, if any, improvement in the market for domestic lump and nut in the Colorado field. Rising temperatures in Nebraska and Kansas consuming territory have left southern Colorado with approximately 300 "no bills" and the lignite districts with about 50 unbilled loads. Steam-coal demand, however, is well maintained and Colorado and Wyoming slack are strong at \$1.75. Cold weather west

of Utah did not last long enough to wipe out track accumulations at the mines and the domestic market is unsteady. Slack, too, is easy.

#### Cincinnati Market Seesaws

The seesaw in the Cincinnati market still continues. Considering the time of the year the volume of spot business has been exceptional, but fluctuations in prices and wide variations have been common. Smokeless lump and egg, for example, have been selling all the way between \$3 and \$4, with nut and stove \$2.75@3.50 where these sizes have not moved on a mine-run basis. The latter coal was \$2.50@3 last week. Slack was steady and strong at \$2.50.

Good Hazard and Harlan block sold at \$2.50@3; some less desirable coal from southeastern Kentucky went at \$2.25. West Virginia high-volatile lump was \$2.25@2.75. The better grades of gas slack sold at \$1.75@2, while some of the poorer coal was as low as \$1.25. Cincinnati retail prices were reduced last week to \$9 on smokeless lump, \$7.50 on domestic and \$6.50 on steam mine-run; \$7 on bituminous lump and \$5@5.50 on slack.

Coal movement through the Cincinnati gateway took another drop last week. The total number of coal loads interchanged was 12,040 cars—a decrease of 878 cars when compared to the preceding week and a decrease of

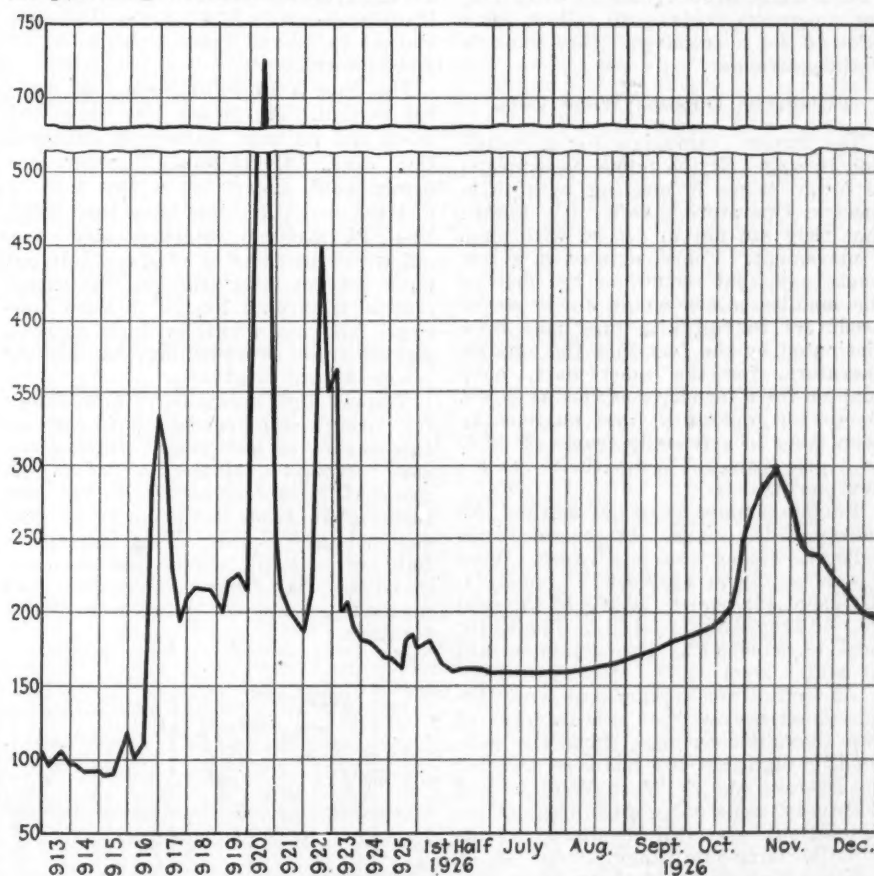
265 when compared to the corresponding week in 1925. The biggest losses were on the Louisville & Nashville—296 cars—and the Chesapeake & Ohio—542 cars. During the week 13,035 empties were en route to the mines, as compared to 14,404 cars the preceding week.

#### Columbus in Doldrums

Holiday indifference and milder weather have put the Columbus trade in the doldrums. Prices have receded until they are within 25 to 50c. of the quotations prevailing prior to the late summer boom. Distress coal, although decreasing in volume, is still a real factor in the central Ohio market, but cancellations of unfilled orders are diminishing. Southern Ohio production approximates 35 to 40 per cent of capacity.

The closing down of many industries over the holiday period and the slackening of operations at others kept business in northern Ohio at a low ebb last week. Prices, however, showed no change in the limited trading possible under the prevailing conditions. Production in the No. 8 field during the week ended Dec. 18 approximated 343,000 tons, or about 50 per cent of capacity. This was 18,000 tons less than the output the preceding week but 68,000 tons ahead of last year.

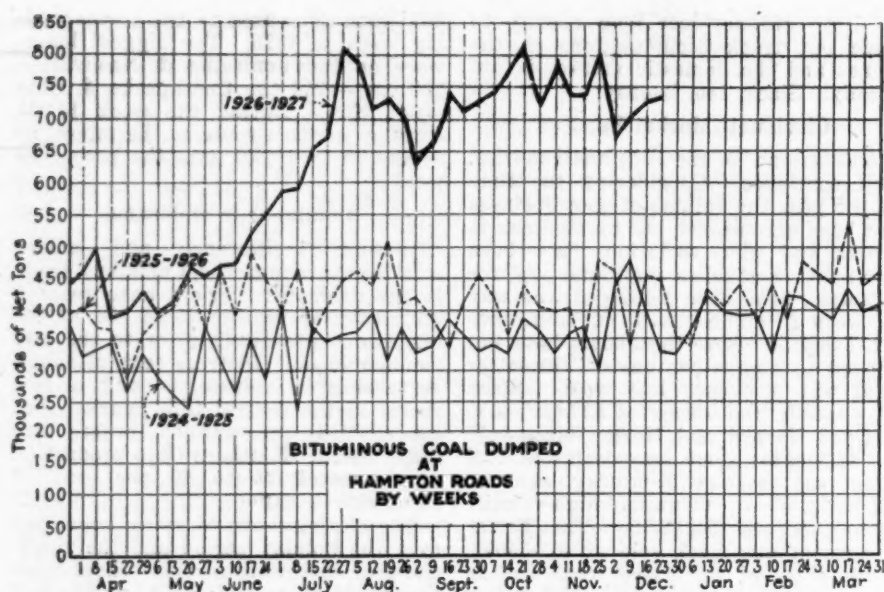
In so far as actual spot business was



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1926				1925	
	Dec. 27	Dec. 20	Dec. 13	Dec. 6	Dec. 28	Dec. 29
Index .....	198	200	214	236	178	171
Weighted average price .....	\$2.40	\$2.42	\$2.59	\$2.72	\$2.16	\$2.06

This diagram shows the relative, not the actual, price on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportion each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Price of Coal and Coke: 1913-1918," published by the Geological Survey and the War Industries Board.



concerned, last week in the Pittsburgh district was a quiet one. Prices, except on gas slack, were unchanged, not because demand was strong enough to check further declines but because the existing levels are such that producers prefer to close down if buyers insist upon still greater concessions. There are, it is true, occasional sales of distress tonnage at less than these figures, but operators refuse to allow such sales to set a standard. Gas slack is slightly stronger.

#### Pittsburgh Opposes Wage Cuts

The buyers' campaign for a reduction in wages at the mines as a means to lower prices is meeting with little success. Operators have let it be known that they are not in accord with such a movement. Fears, expressed a few weeks ago, that reductions by some of the smaller mines would force larger producers to fall into line have been dissipated by the fact that the smaller operators, for the most part, have adopted the alternative of closing down. Open-shop operators are anxious to keep labor in a friendly frame of mind as a preventive of sympathetic strikes next spring.

Further slumps in prices marked the course of the market in central Pennsylvania during the past week. Pool 1 was quoted at \$2.65@2.75; pool 71, \$2.50@2.55; pool 9, \$2.35@2.45; pool 10, \$2.25@2.35; pool 11, \$2@2.10; pool 18, \$1.90@2. Production is still at a high level.

At Buffalo the holiday letdown is accentuated by complaints that much of the Canadian business formerly handled through that city has been diverted to Detroit and to West Virginia and Kentucky coals at profit-killing prices. Quotations are still declining. Low-volatile mine-run ranges from \$2 on Indiana County to \$3.25 on West Virginia; lump, from \$3.25@4.50. In the high-volatile division Pittsburgh and No. 8 steam slack has weakened to \$1.50@1.65.

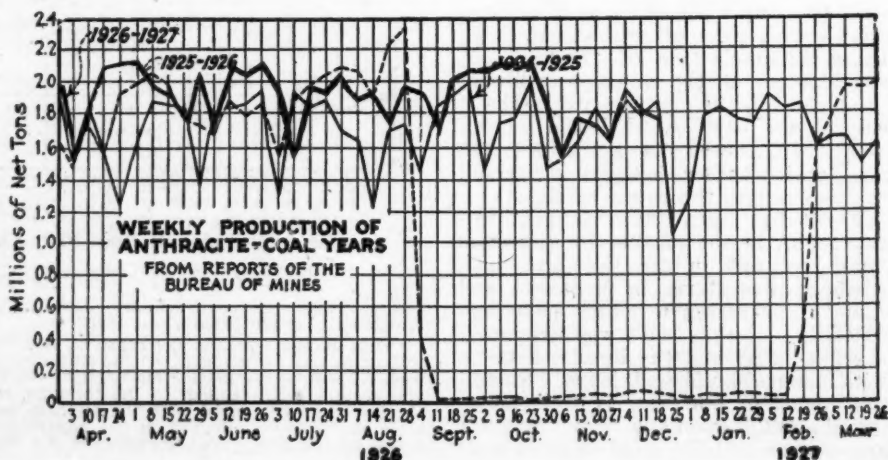
#### Watches Wage Situation

The chief interest in New England at the present time seems to be in how long the West Virginia mines will maintain the Nov. 1 wage increases.

The majority of the steam users have liberal stocks on hand and so are in a position to withhold purchases in the hope of hastening the wage-reduction process. Navy Standard is freely offered at \$5.25@5.45 per gross ton, f.o.b. Hampton Roads, and some sales have been rumored at \$5.10@5.15. For inland delivery, wholesalers are asking \$7@7.25 on cars at Boston and Providence—with few takers. The spot market in all-rail coals is back to the midsummer basis.

The New York bituminous coal market is dull. Movement was slow last week and no new business is expected this week. Quotations, however, are firmly held, except on a few lots of distress coal. Receipts have been light. The Philadelphia market also was quiet. Predictions of renewed interest have not yet been realized. Railroads still seek bargain lots of distress tonnage—and not wholly without success. Export trade is dwindling, but bunker prospects are bright.

The practical cessation of new orders for foreign shipment has flattened out the market at Baltimore. During the past fortnight quotations on steam and gas coals have declined 75c. to \$1. The Birmingham trade is marking time over the holiday period. Spot buying is light in both the steam and domestic divisions, but there have been no marked concessions offered to move tonnage.



#### Car Loadings and Supply

	Cars Loaded— All Cars	Coal Cars
Week ended Dec. 11, 1926.....	998,715	237,735
Week ended Dec. 4, 1926.....	1,058,151	251,626
Week ended: Dec. 12, 1925.....	1,008,824	191,884
Week ended Dec. 5, 1925.....	1,020,873	191,821

	Surplus All Cars	Cars Coal Cars	Car Shortages— All Cars	Coal Cars
Dec. 8, 1926	164,580	15,335	.....	.....
Nov. 30, 1926	144,921	12,521	.....	.....
Dec. 7, 1925	159,897	54,277	.....	.....

Anthracite domestic sizes are moving slowly in the New York market. Tonnage has been accumulating, but this situation may be relieved by the shorter running schedules over the holiday season. Egg is the greatest laggard. Some operators are storing this; some are breaking it down into smaller sizes. Small quantities of chestnut and stove also are going into storage. Steam sizes, on the other hand, have been stronger. During the past week some grades of independent buckwheat brought full company circular.

#### Domestic Anthracite Weaker

If anything, domestic anthracite was weaker in Philadelphia last week than was the case a fortnight ago. Retail yards are well stocked with coal and are buying very sparingly. Paralleling the situation in New York, the steam trade was in good shape and there was an actual dearth of free buckwheat. In one case the circular has been advanced from \$2.50 to \$2.75. Rice and barley are well sold up. Storage piles of steam coals are diminishing.

Baltimore domestic demand for hard coal is satisfactory, but most of the buying is in small lots. At Buffalo, on the other hand, the trade is unsteady, with surplus coal still on track. Business is seasonably active at Toronto; retail yards are carrying ample stocks. The industrial demand for bituminous is moderate but steady; prices, however, are on the downgrade.

#### Coke Shows Slight Recovery

Offerings of Connellsville beehive coke were light last week. The market, however, was somewhat stiffer toward the close of the period, although there were no advances in spot quotations and \$3.50 appeared to be the top for actual business in furnace grades. More interest is being shown in first-quarter contracts on a basis of \$4@



\$4.25 and at least one independent furnace interest has announced its willingness to sign up.

Production of beehive coke in the Connellsville and Lower Connellsville region during the week ended Dec. 18 was 130,600 tons, according to the Connellsville *Courier*. Furnace-oven output was 61,300 tons, an increase of 6,700 tons when compared with the production during the preceding week. Merchant-oven output was 69,300 tons, a decrease of 2,090 tons—making a net increase over the previous week of 4,610 tons.

### Shanghai Coal Market Firm; Forward Trade Lively

Shanghai, China, Dec. 1.—Negotiations with large consumers for next year's contracts are in progress in the Shanghai coal market. Recently there has been an unusual amount of forward business because of anxiety concerning the future supply here of Chinese coals owing to unrest throughout China and consequent interference with transportation.

There is reflection here of the fact that the coal market in Japan is firm owing to increased demand there for home and oversea consumption. Shipments recently to Europe on account of the coal strike in England have given an added note of firmness to the market. As exchange continues unfavorable to buyers in China of Japanese production, there is little probability of prices coming down on the Shanghai market in the near future.

A certain amount of Shantung coal is now in stock at Tsingtao, in North China, but not sufficient for export.

Shipments of Kaiping (Kailan Mining Co.) coal are coming forward from the North with regularity, and demand for it is strong in all quarters.

### Good Morning! Is This Your Careless Day?

Why are miners in West Virginia more careless between 10 o'clock and 10.11 on Wednesday mornings than at any other time? Mine owners, operating officials, inspectors and insurance authorities are seeking an answer to this question.

Statistics compiled over a series of years and recently made public at the compensation commissioner's office at Charleston disclose that more fatal accidents occur in that period than at any other because of failure to observe safety precautions. For a full day Monday has the fewest accidents.

Coal prices as quoted here follow:

JAPAN COAL		Per ton ex-wharf, tael
Milke dust	.....	12.00
Kishima lump	.....	14.00
Takamatsu lump	.....	9.80
Takao lump	.....	9.50
FUSHUN COAL		
Dust	.....	11.00
Kirigomi	.....	11.80
Lump	.....	13.50
HAIPHONG COAL		
"B" lump	.....	15.75
"B" dust	.....	6.25
"C" lump	.....	17.50
"C" dust	.....	7.50
KAIPING COAL		
No. 1 lump, unscreened	.....	12.00
No. 2 lump, unscreened	.....	10.50
Nuts, unscreened	.....	11.00
Special slack	.....	9.50
No. 1 slack	.....	8.40
Special coke	.....	24.00
FORMOSA COAL		
Dust	.....	10.50
Kirigomi	.....	11.30
Lump	.....	13.00

At the prevailing rate of exchange the tael is equivalent to approximately 56c. in United States currency.

### Industrial Users Buy Coal On Scientific Basis

Coal buying on a more scientific basis for industrial use appears to be the order of the day. Purchasing agents now demand analyses of coal and make burning tests before placing orders or contracts, and where they find a satisfactory fuel it is growing harder and harder to get them to change over where good service and fair treatment are rendered.

In Louisville the Purchasing Agents' Association, composed of buyers representing the largest industries, met recently to discuss coal. It was the consensus of opinion that now that the British strike is over, with the removal of conditions forcing high prices, it was reasonable to expect better service and somewhat lower prices.

It was agreed that B.T.U. were to have greater consideration in the future, as the day of merely dumping coal on a hit and miss basis is over. While the difficulties of the operators are recognized, it was declared that more scientific methods of mining, better machinery and better direction are among the factors which will result in a steadier flow of good coal at steadier prices to industrial consumers.

It was contended that although the foreign situation and other matters affecting the coal market had been eased, there appeared to be a tendency not to reduce the price in keeping with conditions, but it was further contended that the law of supply and demand would accomplish this. Buying from now until after the first of the year, it is thought, will be lighter, in order to reduce stocks over inventory, and consumption will be curtailed.

Traffic and its relation to buying will be discussed at a later meeting.

## Coal Produced in Pennsylvania in 1925\*

(Exclusive of product of wagon mines)

County	Net Tons			Made Into Coke at Mines	Total Quantity	Value		Number of Employees					Average Number Days Worked	Average Tons per Man per Day
	Loaded at Mines for Shipment	Sold to Local Trade and Used by Employees	Used at Mines for Steam and Heat			Total	Average per Ton	Miners, Loaders, and Shot-firers	Haulage and Track	All Others	Surface	Total		
Allegheny.....	9,847,185	2,073,261	81,912	.....	12,002,358	\$25,879,000	\$2.17	11,573	1,598	1,378	1,679	16,228	167	4.42
Armstrong.....	2,923,519	215,185	41,333	.....	3,180,037	5,905,000	1.86	3,445	391	488	541	4,865	167	3.92
Beaver.....	208,550	105,408	552	.....	314,510	665,000	2.11	215	30	12	100	357	219	4.02
Bedford.....	432,925	8,466	1,302	.....	442,693	1,094,000	2.47	713	102	70	100	985	137	3.28
Blair and Fulton.....	179,244	26,681	2,121	14,212	222,258	593,000	2.67	350	42	23	37	452	224	2.20
Bradford and Lycoming	31,602	3,683	.....	.....	35,285	111,000	3.15	53	19	3	9	84	215	1.95
Butler.....	1,916,491	72,782	7,289	.....	1,996,562	3,810,000	1.91	1,798	283	154	309	2,544	225	3.49
Cambridge.....	14,438,849	2,591,687	142,571	153,408	17,326,515	39,538,000	2.29	15,643	1,943	1,553	2,130	21,269	197	4.14
Center.....	967,104	50,917	1,934	.....	1,019,955	2,061,000	2.02	1,159	138	104	176	1,577	166	3.90
Clarion.....	1,415,869	91,663	7,730	.....	1,515,262	2,792,000	1.84	1,780	212	136	261	2,389	201	3.15
Clearfield.....	5,274,680	242,783	45,831	22,990	5,586,284	11,817,000	2.12	6,816	674	699	1,022	9,211	171	3.55
Clinton.....	161,129	24,887	2,797	.....	188,813	376,000	1.99	147	16	32	102	297	164	3.88
Elk.....	981,442	22,870	34,322	.....	1,038,634	2,279,000	2.19	1,340	113	74	171	1,698	181	3.3
Fayette.....	18,856,923	243,998	491,098	9,227,089	28,819,108	62,668,000	2.17	12,691	2,642	6,792	4,248	26,375	232	4.72
Greene.....	5,082,311	33,848	45,181	24,625	5,185,965	10,177,000	1.96	1,958	472	719	599	3,748	269	5.15
Huntingdon.....	637,842	17,130	18,231	.....	673,203	1,803,000	2.68	1,064	130	82	166	1,442	183	2.55
Indiana.....	7,752,702	228,136	33,273	294,568	8,308,679	16,067,000	1.93	7,010	693	830	1,061	9,594	205	4.22
Jefferson.....	2,553,728	68,310	35,705	332,722	2,990,465	6,043,000	2.02	3,271	294	408	431	4,404	212	3.21
Lawrence.....	173,331	57,124	11,314	.....	241,769	795,000	3.29	197	50	40	46	335	259	2.80
McKean and Venango	5,396	7,131	.....	.....	12,527	27,000	2.16	20	6	5	7	38	238	1.39
Mercer.....	254,051	8,634	13,801	.....	276,486	779,000	2.82	261	49	40	54	404	226	3.03
Somerset.....	9,208,986	143,500	98,472	.....	9,450,958	18,513,000	1.96	7,103	980	909	1,303	10,295	219	4.20
Tioga.....	156,242	38,028	3,844	.....	198,114	709,000	3.58	598	82	42	122	844	90	2.60
Washington.....	14,630,279	462,550	97,699	83,919	15,274,447	32,006,000	2.10	13,282	1,828	1,910	1,843	18,863	167	4.85
Westmoreland.....	16,365,858	746,184	298,830	3,216,260	20,627,132	41,392,000	1.99	11,211	1,910	2,564	2,819	18,504	226	4.94
Total bituminous.....	114,456,238	7,584,846	1,517,142	13,369,793	136,928,019	128,899,000	\$2.10	103,698	14,697	19,067	19,336	156,798	200	4.36
Anthracite.....	53,768,372	2,884,577	5,164,200	.....	61,817,149	327,665,000	5.30	78,773	17,000	24,795	39,744	160,312	182	2.12
Grand total.....	168,224,610	10,469,423	6,681,342	13,369,793	198,745,168	\$615,564,000	\$3.10	182,471	31,697	43,862	59,080	317,110	191	3.28

\* The figures relate only to active mines of commercial size that produced coal in 1925. The number of such bituminous mines in Pennsylvania was 1,974 in 1925, 2,122 in 1924, and 2,868 in 1923.

Methods of mining in the bituminous mines in 1925: The tonnage undercut by hand was 43,720,883; shot off the solid, 4,593,373; cut by machines, 86,973,404; mined by stripping, 800,615; not specified, 839,744.

Size classes of commercial bituminous mines in 1925: There were 48 mines in

Class 1 A (500,000 tons and over), producing 26.3 per cent of the tonnage; 132 in Class 1 B (200,000 to 500,000 tons), with 30.7 per cent; 176 in Class 2 (100,000 to 200,000 tons), with 18.1 per cent; 221 in Class 3 (50,000 to 100,000 tons), with 11.5 per cent; 652 in Class 4 (10,000 to 50,000 tons), with 11.4 per cent, and 745 in Class 5 (less than 10,000 tons), producing 2 per cent.

Compiled by U. S. Bureau of Mines.

## Foreign Market And Export News

### November Soft-Coal Exports Break All Records

Exports of bituminous coal from the United States in November broke all monthly records. The total quantity consigned to foreign countries was 4,605,169 gross tons, as compared with 4,188,365 tons in October, 1926, and 4,580,169 tons in October, 1920. In the last-named month, which previously held the record, the total included 1,994,832 tons to Canada. In November, 1926, Canadian shipments were 1,274,309 tons. The United Kingdom and North Ireland again proved the biggest customer, taking 2,026,769 tons.

Anthracite exports for the month were far ahead of last year, when the hard-coal mines were tied up by a strike, but less than in October, 1926. Coke exports were smaller than in October, 1926, and November, 1925.

The distribution of the November, 1926, shipments was as follows:

To	Anthracite Gross Tons	Bituminous Gross Tons	Coke Gross Tons
Asores and Madeira Islands.....		8,440	
Denmark and Faroe Islands.....		40,170	
France.....		122,160	1,007
Gibraltar.....		36,897	
Greece.....	10		
Irish Free State.....		125,713	
Italy.....		182,411	
Latvia.....		7,782	
Malta, Gozo and Cypress Islands.....		13,152	
Netherlands.....		14,590	
Norway.....		44,185	
Portugal.....	136	41,761	
Spain.....		5,953	
Sweden.....		4,488	
United Kingdom and North Ireland.....	169	2,026,769	500
Canada.....	337,973	1,274,309	64,294
British Honduras.....		237	
Guatemala.....			2
Honduras.....		47	
Nicaragua.....		100	
Panama and Canal Zone.....		21,717	
Mexico.....	750	7,561	21
Newfoundland and Labrador.....	7,271	12,774	
Bermuda.....		937	
Barbados.....	28	6,877	
Jamaica.....	26	14,641	
Trinidad and Tobago.....	300	13,195	
Other British West Ind. Cuba.....	20	2,291	
Dominican Republic.....	3,028	38,501	1,069
Dutch West Indies.....	20	244	
French West Indies.....		11,441	5
Virgin Islands of the United States.....		10,502	
Argentina.....		21,343	
Bolivia.....		134,337	
Brasil.....		6,351	
Chile.....		161,306	65
Colombia.....		1	
Ecuador.....		9,245	12
Falkland Islands.....		15	
British Guiana.....		3,506	
Dutch Guiana.....		630	
Peru.....		30	
Uruguay.....		1,853	72
Venezuela.....		12,146	85
Egypt.....		1,568	10
Algeria and Tunisia.....		43,688	
Other French Africa.....		28,679	
Morocco.....		7,724	
Portuguese East Africa.....		8,844	
Other Portuguese Africa.....		3,500	
Canary Islands.....		26,827	
Total.....	349,731	4,605,169	67,142
November, 1925.....	31,426	1,477,023	86,551

### French Buyers Not Eager For British Coal

Paris, France, Dec. 9.—The resumption of British mining is to be followed by no rush of French buying, according to present market indications. On the contrary, it probably will be some time before stocks accumulated by private consumers and requisitioned coal sent to public agencies have been exhausted.

Details of the agreement between this country and the Kohlsyndikat on the commercialization of German fuel imports into France are being ironed out on a basis satisfactory to the French consumers, who insisted that the agreement providing that commercial receipts might be treated as presentations in kind should not be allowed to become effective until all questions relating to metallurgical coke, railway fuel and commercial coal should be settled. An understanding already has been reached on coke and it is expected that the other questions will find an early solution.

Reports from Brussels show a revival in domestic demand because of the advent of colder weather. The industrial side of the market is marking time, with prices on sized coals easier and more offers from British and German sources. France still is shipping considerable tonnage, profiting by a favorable rate of exchange. A general letdown early in 1927, however, seems inevitable.

### Protest Korean Development

Shanghai, China, Dec. 1.—The establishment of a company to operate the anthracite mines in Korea which have hitherto been under the direction of the Korean Government General has raised a difficult question. According to the *Osaka Jiji*, the Japanese naval authorities strongly oppose the plan of the Government General to allow a company to exploit these mines, and has lodged a protest with the government. They have asked that the mines in the Heian Nando district be reserved for the navy. Japanese men-of-war largely consume heavy oil as fuel, but auxiliary ships still depend much on anthracite.

The Government General has replied that the protest came too late, as permission has been granted for the launching of the company.

### Export Clearances, Week Ended Dec. 23

FROM HAMPTON ROADS	
For United Kingdom:	Tons
Br. Str. Penhill .....	4,398
Br. Str. Rimouski .....	9,963
Span. Str. Manuchu .....	4,700
Br. Str. Tuskar Light .....	5,779
Br. Str. Kambole .....	6,419
Ital. Str. Maria .....	7,414
Ital. Str. Boheme .....	6,124
Br. Str. Cedrington Court .....	7,194
Br. Str. Manchester Brigade .....	7,271
Nor. Str. Dicto .....	5,100

Amer. Str. Tashmoo .....	4,292
Br. Str. Amicus .....	5,822
Br. Str. Indianola .....	7,476
Br. Str. Wimborne .....	8,753
Br. Str. City .....	3,972
Swed. Str. Strassa .....	7,476
Nor. Str. Anjer .....	6,140
Br. Str. Moorish Prince .....	7,988
Br. Str. Wordsworth .....	5,474
For Tunisia:	
Amer. Str. Oakley L. Alexander, for Biserta .....	7,111
For Argentina:	
Br. Str. North Anglia, for Buenos Aires .....	5,162
Br. Str. Bainsizza, for Buenos Aires .....	5,069
J.-S. Str. Istok, for Buenos Aires .....	6,590
For Italy:	
Ital. Str. Hermenda, for Genoa .....	6,309
Ital. Str. Alfa, for Palermo .....	5,315
Ital. Str. Vindice, for Genoa .....	6,603
For Cuba:	
Nor. Str. Haraldshaugm for Isabel-lade .....	1,963
For New Brunswick:	
Dan. Str. Ivar, for St. Johns .....	3,009
For Brazil:	
Br. Str. Islemoor, for Rio Janeiro .....	5,501
Br. Str. Fayle, for Rio Janeiro .....	6,235
For England:	
Br. Str. Tapti, for Mersey River .....	6,532

### FROM BALTIMORE

For England (for Queenstown for orders):	
Br. Str. Magdala .....	6,984
Grk. Str. Hadlotis .....	7,897
Span. Str. Alu Mendi .....	5,218
Span. Str. Magdalene R. de Garcia .....	3,531
Nor. Str. Havo .....	7,145
Span. Str. Banana .....	3,942
Br. Str. City of Melbourne .....	9,451
Br. Str. Glenbuss .....	5,844
Ital. Str. Isabo .....	7,995
For Ireland:	
Br. Str. Glenmorag, for Belfast .....	5,572
Br. Str. Buckleigh, for Dublin .....	7,547
For Argentina:	
Br. Str. Hazelgrove, for Buenos Aires .....	3,834
Br. Str. North Devon, for Buenos Aires .....	5,343
For Brazil:	
Grk. Str. Nicos, for Rio Janeiro .....	6,299
For Egypt:	
Br. Str. Chertsey, for Alexandria .....	4,789
For Gibraltar:	
Br. Str. Essex Druid .....	5,137

### FROM PHILADELPHIA

For United Kingdom:	
Br. Str. Pencisely, Daybeam, King Gruffyd, Lady Brenda, Coggsdale, Roxby and Ingleby .....	—
For Cuba:	
Nor. Str. Vindegggen, for Havana .....	—
For Brazil:	
Br. Str. Ledbury, for Rosario .....	—
For Uruguay:	
J.-S. Str. Njegos, for Montevideo .....	—
For Argentina:	
Br. Str. Segura, for Buenos Aires .....	—
For Africa:	
Fr. Str. Kairouan, for Dakar .....	—

### Hampton Roads Coal Dumpings\*

	(In Gross Tons)	Dec. 16	Dec. 23
N. & W. Piers, Lamberts Pt.:			
Tons dumped for week.....		223,644	270,715
Virginian Piers, Sewalls Pt.:			
Tons dumped for week.....		152,132	163,000
C. & O. Piers, Newport News:			
Tons dumped for week.....		261,305	209,937

\*Data on cars on hand, tonnage on hand and tonnage waiting withheld due to shippers' protest.

### Pier and Bunker Prices, Gross Tons

PIERS		Dec. 16	Dec. 23†
Pool 1, New York.....	\$6.50@	\$6.75	\$6.50@
Pool 9, New York.....	5.50@	5.75	5.50@
Pool 10, New York.....	5.25@	5.50	5.25@
Pool 11, New York.....	4.75@	5.25	4.75@
Pool 9, Philadelphia.....	5.70@	6.20	5.80@
Pool 10, Philadelphia.....	5.10@	5.30	5.40@
Pool 11, Philadelphia.....	4.80@	5.10	5.00@
Pool 1, Hamp. Roads.....	5.40		5.50
Pool 2, Hamp. Roads.....	5.20		5.20
Pool 3, Hamp. Roads.....	5.05@	5.15	6.00@
Pools 5-6-7, Hamp. Rds.....	4.75		4.80

### BUNKERS

Pool 1, New York.....	\$6.75@	\$7.00	\$6.75@
Pool 9, New York.....	5.75@	6.00	5.75@
Pool 10, New York.....	5.50@	5.75	5.50@
Pool 11, New York.....	5.00@	5.50	5.00@
Pool 9, Philadelphia.....	5.95@	6.45	6.85@
Pool 10, Philadelphia.....	5.35@	5.55	5.65@
Pool 11, Philadelphia.....	5.05@	5.35	5.25@
Pool 1, Hamp. Roads.....	5.50		5.60
Pool 2, Hamp. Roads.....	5.30		5.30
Pools 5-6-7, Hamp. Rds.....	4.85		4.90

†Advances over previous week shown in heavy type, declines in italics



## Coming Meetings

**Monongahela Coal Association.** Annual meeting, Jan. 13, at Morgantown, W. Va. Secretary, D. H. Pape, Morgantown, W. Va.

**American Society of Civil Engineers.** Annual meeting, Jan. 19-21, 1927, at Engineering Societies Bldg., New York City. Secretary, George T. Seabury, 29 West 39th St., New York City.

**American Wood Preservers' Association.** Annual meeting, Jan. 25-27, 1927, at Nashville, Tenn. Secretary, E. J. Stocking, 111 W. Washington St., Chicago, Ill.

**Philadelphia Coal Club.** Annual meeting, Jan. 27, 1927, at the Bellevue-Stratford Hotel, Philadelphia, Pa. Secretary, Charles K. Scull, Philadelphia, Pa.

**Northeast Kentucky Coal Association.** Annual meeting, Jan. 27, 1927, at Ventura Hotel, Ashland, Ky., Secretary, C. J. Neekamp, Ashland, Ky.

**American Institute of Electrical Engineers.** Midwinter convention, Feb. 7-10, Engineering Societies Bldg., New York. Secretary, F. L. Hutchinson, 33 W. 39th St., New York City.

**American Institute of Mining and Metallurgical Engineers.** Annual meeting, Feb. 14-17, 1927, Engineering Societies Bldg., New York City. Secretary, H. Foster Bain, 29 West 39th St., New York City.

## New Companies

Articles of incorporation have been filed by the **Davidson-Tressel Coal Co.**, of Shelbyville, Ind. The company has a capital stock of \$10,000 and is formed to mine and sell coal. The incorporators are Claude Tressel, Andrew Davidson and Richard G. Kirk.

**The Freeburg Coal Co.**, Freeburg, Ill., has been incorporated with capital of \$50,000 to mine and sell coal. The incorporators are J. J. Bullington, Anthony J. Stoeckel and C. A. Gent.

**The Floyd Coal & Land Co.**, Williamson, W. Va., with a capital of \$25,000, has been incorporated by G. R. C. Wiles and L. M. Brant.

**The Interstate Coal Co.**, 1363 South Dearborn Street, Chicago, has been incorporated to mine and deal in coal and byproducts of coal. The incorporators are William A. Brewerton, Roy O. West and Percy B. Eckhart.

Papers have been filed chartering the **Sylvia Coal Co.**, Sylvia, Ohio, with a capital of \$10,000 to mine and sell coal. The incorporators are Harry W. Cooper, Wanda W. Cooper, Bertha E. Goodwin, Ivo J. Flory and Rose Wensenberger.

**The Climax Coal Co.**, with a capital of \$50,000, has been incorporated by E. L. Michie, 315 Duffy Street, Charleston, W. Va.

**The Capehart Coal & Coke Co.**, New Haven, W. Va., with a capital of \$750,000, has been incorporated by L. Ray Capehart and I. A. Capehart.

## New Equipment

### Oil Pressure Operated Remote Control Valve

A remote control made by the General Electric Co., Schenectady, N. Y., operates a valve with oil pressure, electrically controlled. The valve is opened and closed by oil that is pumped into the cylinder by a small motor-driven rotary pump. The control equipment consists of a reversing switch, two interlocked pressure switches and an "open-closed-stop" push-button station. The energizing coil on the reversing switch is connected through the contacts on the pressure switch so that, when one of these devices is opened, the other is closed. The coil is also connected to the push-button stations.

In order to open the valve, the "open" button is depressed. Oil is pumped from the top of the valve cylinder into the bottom, thus forcing up the piston and opening the valve. When the valve is open it builds up the pressure on the pressure switch, opening the energizing circuit and the reversing switch and, because of the interlocking features on the devices, it closes the pressure switch contacts on the closing side of the valve.

To close the valve the "closed" button is pressed, the oil is pumped from the bottom of the valve cylinder to the top and the piston is forced down. As the gate seats pressure is built up. This opens the pressure switch and thus stops the motor. The pressure switch is placed in position for operating when it is desired to open the valve. Incandescent lamps are so arranged that they indicate at all times the position of the valve, whether open, operating or closed.

### Large-Capacity Duster Developed

After a period of experimental work extending over two years the Mine Safety Appliances Co., Pittsburgh, Pa., announces its new rock-dust distributor.



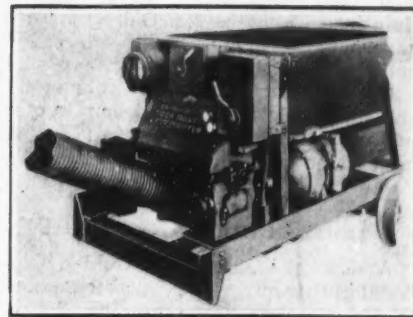
#### Controls Simple and Accessible

All the gears on the car are encased and run in oil. Both of the motors are totally inclosed. Rugged in design, it is claimed the construction is fool proof.

Being of simple design and rugged construction, efficient operation and low maintenance cost are stated to be the most important features of this new machine.

A maximum rate of discharge of 125 lb. per minute is obtained through the use of a pair of screw conveyors but

the discharge may be varied to suit conditions as a variable speed motor is used. Two types of machine are available; one for low-seam and the



#### Discharge Can Be Regulated

On the rear a fan is directly connected to a motor. This fan produces 1,600 cu. ft. of air per minute, which properly aerates the dust. It is claimed that the pressure of 9½ in. w.g. developed is sufficient to apply the rock dust in an efficient manner.

other for high-seam operations, the one measuring 39 in. in height and the other 45 in., both measurements being above the rail. Special types may be built that would be about 32 in. high. Any design can be provided with equipment which has the approval of the U. S. Bureau of Mines, and can be constructed to fit any track gage.

### Spring Motor Quick Trip Made For Recording Meters

About a year ago the Esterline-Angus Co., Indianapolis, Ind., announced an electric-motor-driven quick-trip graphic instrument for making records at exceedingly high chart speeds. In this instrument an electric motor, running continuously, is brought into engagement with the chart drive by an electro-magnet whenever an electrical disturbance occurs. As a result of the experience with these instruments a demand sprung up for a quick-trip instrument which does not have the continuously running motor. There are many places where a separate circuit for the operation of the motor is not available and obviously such a machine could not well be operated from the circuit whose disturbances it is intended to record.

To meet this demand the company has developed a spring motor capable of driving the chart for several minutes at a speed of 1, 1½, or 3 in. per second. These instruments are in every way standard, except for the attachment which makes the high chart speeds possible. When conditions are normal the clock in the instrument case drives the chart at slow speed. When a disturbance occurs the closing relay operates an electro-magnet in the motor case and in less than 1/10 sec. the spring motor brings the chart to either 1, 1½ or 3 in. per second. As soon as the disturbance ends the relay

opens the circuit of the electro-magnet, the spring motor continues to drive the chart at high speed until it is brought to the proper time, when the motor is disconnected and the clock resumes driving the chart at slow speed until the next disturbance occurs. The device for resetting the chart to the proper time after a disturbance is an essential one, as operation at high chart speed throws the chart out of time, and resetting it to the proper time insures that a succeeding disturbance will be recorded at the proper hour of the day. The spring motor has sufficient capacity to record four or five successive disturbances without requiring re-winding. This, it is stated, has been found to be sufficient.

### Long Range Floodlight

A new 24-in. diameter Golden Glow floodlighting projector has been placed on the market by the Electric Service Supplies Co., Philadelphia, Pa. This new projector is known as type FLA-2430 and is to meet service condition such as imposed where space for tower location is available only at either end of the area to be floodlighted. This new unit projects a long-range beam of high intensity.

Type FLA-2430 floodlighting projectors consist of cast aluminum alloy case, approximately  $\frac{1}{4}$  in. thick, equipped with hinged rear door made of the same material and in which a 24-in. diameter "Golden Glow" or crystal mirror glass reflector is flexibly mounted. This construction provides easy access to the reflector for relamping or cleaning without disturbing the lamp or its focusing, or the directional training of the floodlight. The focusing device is fitted with a Mogul socket. It is adapted for use with standard 1,000 to 1,500-watt type "C" Mazda lamps with the PS-52 bulb for regular floodlighting or the 1,000-watt type "C" Mazda lamps with the G-40 bulb for highly concentrated long-range work. The entire unit is mounted on a swivel trunion allowing for directing the beam of light in any direction and with provision for locking firmly in position.

### Portable Meters Are Available For Wide Range of Uses

To meet the demand for a small and inexpensive portable measuring instrument made necessary by the increasing use of alternating current, the Roller-Smith Co., 233 Broadway, N. Y., has announced its Types HTA and HA wattmeters for single-phase alternating current and direct current.

These instruments are suitable for testing alternating current motors and generators, light and power circuits, small appliances, etc. The types HTA and HA comprise ammeters up to and including 50 amp., voltmeters as high as 300 volts, and direct-current and single-phase wattmeters with maximum capacities of 30 amp. and 300 volts. The company claims that these ammeters and wattmeters can be used for higher currents by means of 5 amp. capacity instruments with external

current transformers having suitable ranges of transformation.

In order to combine in one instrument the ranges of several individual ones, voltmeters are supplied with double and triple ranges and wattmeters with double voltage capacity when wanted. The manufacturer states that all these instruments are designed so



#### Can Be Carried in the Pocket

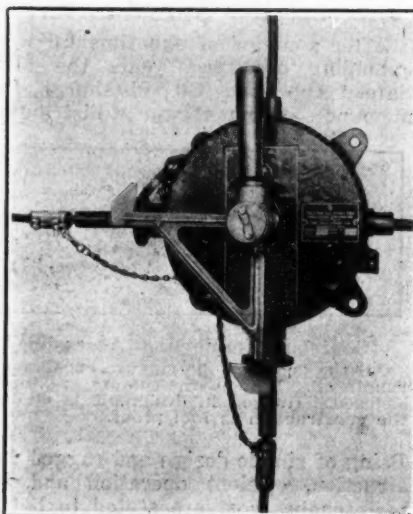
These types of measuring instruments cover a wide range in current and voltage capacities for either direct or alternating current. They are light and compact.

that they may be used on direct-current circuits with good accuracy, this being particularly true of the ammeters, wattmeters and voltmeters of 150 volts and over.

### Approved Gas-Proof Junction Box Now Available

To fill the need for an approved gas-proof fused junction or switch box for use in gaseous mines the Ohio Brass Co., Mansfield, Ohio, has announced a new direct-current junction box which bears the approval plate of the U. S. Bureau of Mines.

This device provides fuse protection and a disconnecting switch for loading



#### Increases Safety in Gassy Mines

Making or breaking the circuit, or blowing of a fuse takes place inside the gas-proof malleable iron case. The inside is thoroughly lined with Dirigo molded insulation and transite and ebonite asbestos wood.

machines, cutting machines, conveyors, hoists and other similar motor-driven equipment. Such machines, especially those which are within the permissible class, can now have acceptable protection.

The junction box may be used as a permanent switch installed in a room to give protection for each machine or there might be several of the boxes conveniently located for one machine that may be working a number of rooms. Another scheme would be its use installed on the machine itself.

The device is a double-pole, double-break, gas-proof switch with two fuses, so interlocked that the plug contacts on the motor side cannot be inserted or removed while the switch is in the "on" position. It is also interlocked so that the cover cannot be removed nor can a fuse be inserted while there is current on the fuses.

The switch will break the circuit under load if an emergency requires or if done by accident. It has a quick-break feature and the arc is interrupted at four points. The cover is screwed on so that no gasket is required. This cover must be screwed clear down to the stop before the device becomes operative.

Trico powder packed, inclosed renewable links only are used in this box. The standard ratings, either of which may be used in the same mounting are 200 amp., 250-volt and 100 amp., 600-volt.

### Recent Patents

**Door for Dump Cars;** 1,603,511. Wm. L. Burner, of Koppel, and Oscar E. Kantenwein, New Castle, Pa., assignors to Koppel Industrial Car & Equipment Co., Pittsburgh, Pa. Oct. 19, 1926. Filed March 28, 1925; serial No. 19,021.

**Method and Apparatus for Coal Washing and Ore Concentration;** 1,605,172. Thomas M. Chance, Philadelphia, Pa. Nov. 2, 1926. Filed July 26, 1924; serial No. 728,417.

**Coking Process;** 1,605,378. Frederick W. Speer, Jr., Pittsburgh, Pa., assignor to the Koppers Co., Pittsburgh, Pa. Nov. 2, 1926. Filed Sept. 12, 1918; serial No. 253,684.

**Mine-Car Structure;** 1,605,410. Warren V. Johnson, Bloomsburg, and John L. McDowell, Light Street, Pa., assignors to the American Car & Foundry Co., New York, N. Y. Nov. 2, 1926. Filed April 9, 1926; serial No. 100,869.

**Swivel Mine-Car Hitching Device;** 1,605,461. Allen E. Ostrander, Bronxville, N. Y., assignor to American Car & Foundry Co., New York, N. Y. June 2, 1926. Filed Dec. 3, 1924; serial No. 754,312.

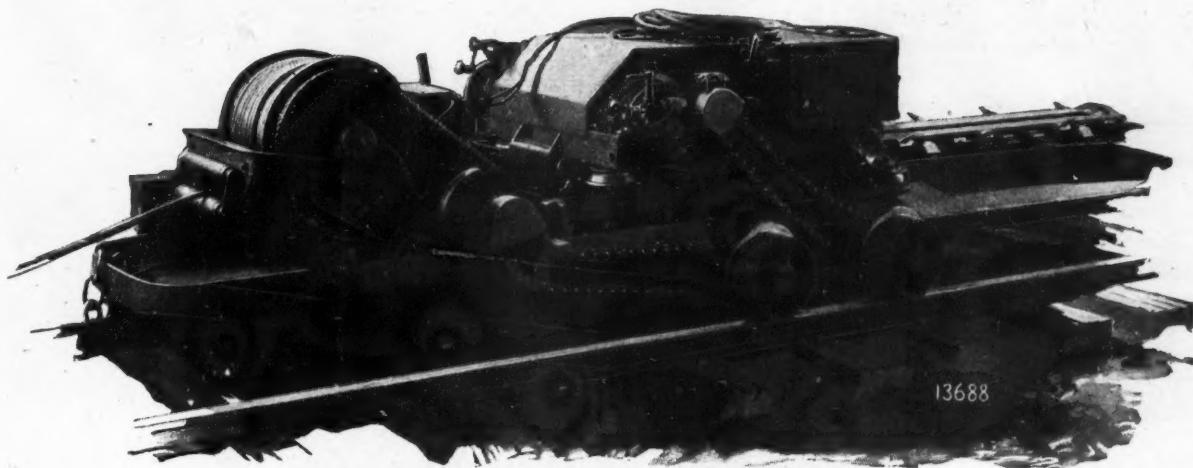
**Convertible Plumb and Level;** 1,605,604. Alric H. Nerbon, Lawrenceburg, Ind. Nov. 2, 1926. Filed Dec. 6, 1924; serial No. 754,363.

**Insulated Safety Electric Blasting Cap;** 1,606,413. Harry L. Grant, Tamaqua, Pa., assignor to Atlas Powder Co., Wilmington, Del. Nov. 9, 1926. Filed July 22, 1925; serial No. 45,327.

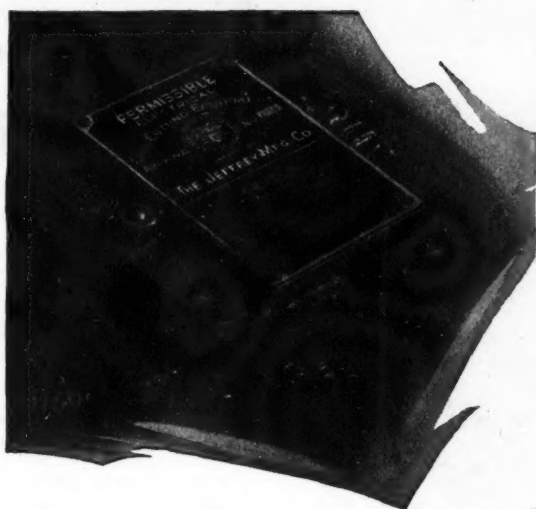


# Government Approved

*Advertisement Number 4 of a Series Describing the Jeffrey Shortwall Coal Cutter*



*Jeffrey 35-B Shortwall Coal Cutter (Permissible Equipment)*



*The Government Approval Plate which appears on Jeffrey 35-B Shortwall Coal Cutters*

THE Jeffrey 35-B Shortwall Coal Cutter and its Handitruck, shown above is of Government Approved Construction, permissible for use in gaseous mines.

This equipment is the same as that used in the standard Jeffrey 35-B Shortwall Coal Cutter, except that all electrical parts are completely enclosed and sealed to protect them from contact with gas. No mine worker except the authorized electrician can have access to the electrical parts, thus eliminating any danger through failure to replace covers.

If you have a gaseous mine, it will be worth your while to investigate this safety feature of Jeffrey 35-B Shortwall Coal Cutters.

## The Jeffrey Manufacturing Company

912-99 North Fourth St., Columbus, Ohio

New York  
Philadelphia

Pittsburgh  
Scranton, Pa.

Charleston, W. Va.  
Chicago

Denver  
Salt Lake City

Birmingham  
Montreal, Canada

### Sales and Service Stations

Pittsburgh, 600 Second Ave.

Salt Lake City, 153 W. Second South St.

Terre Haute, Ind., 319 Cherry St.

Birmingham, 26 South 20th St.

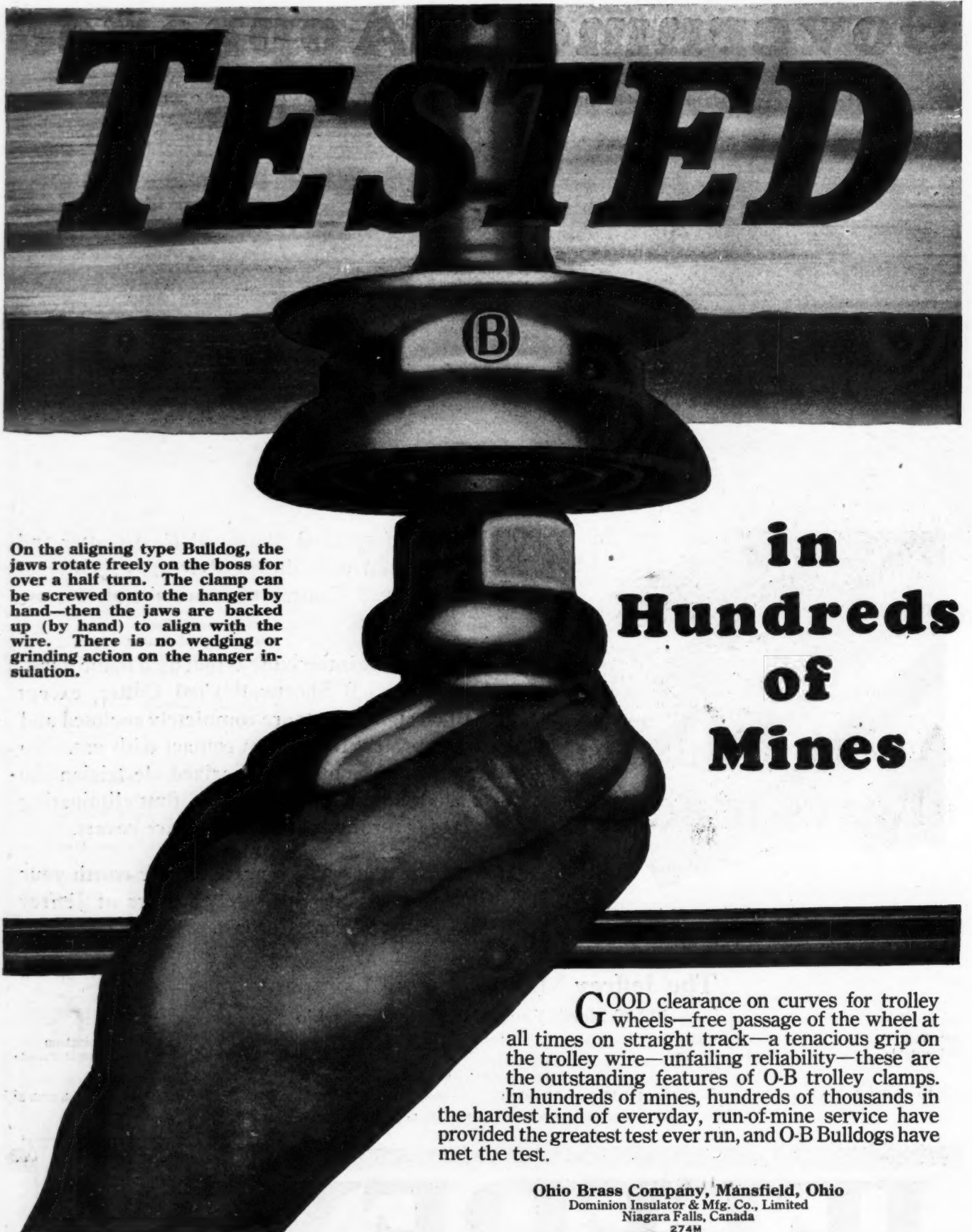
A new Jeffrey Service Station—122 N. Main St., Winchester, Ky.

# JEFFREY

## COAL MINE EQUIPMENT

### Jeffrey Standard Coal Mine Equipment

Coal Cutters  
Combination Cutter and  
Loader  
Drills  
Conveyor-Loader  
Sectional Conveyor  
Pit Car Loaders  
Locomotives  
Mine Fans  
Tipple Equipment  
Crushers



**TESTED**

On the aligning type Bulldog, the jaws rotate freely on the boss for over a half turn. The clamp can be screwed onto the hanger by hand—then the jaws are backed up (by hand) to align with the wire. There is no wedging or grinding action on the hanger insulation.

**in  
Hundreds  
of  
Mines**

GOOD clearance on curves for trolley wheels—free passage of the wheel at all times on straight track—a tenacious grip on the trolley wire—unfailing reliability—these are the outstanding features of O-B trolley clamps. In hundreds of mines, hundreds of thousands in the hardest kind of everyday, run-of-mine service have provided the greatest test ever run, and O-B Bulldogs have met the test.

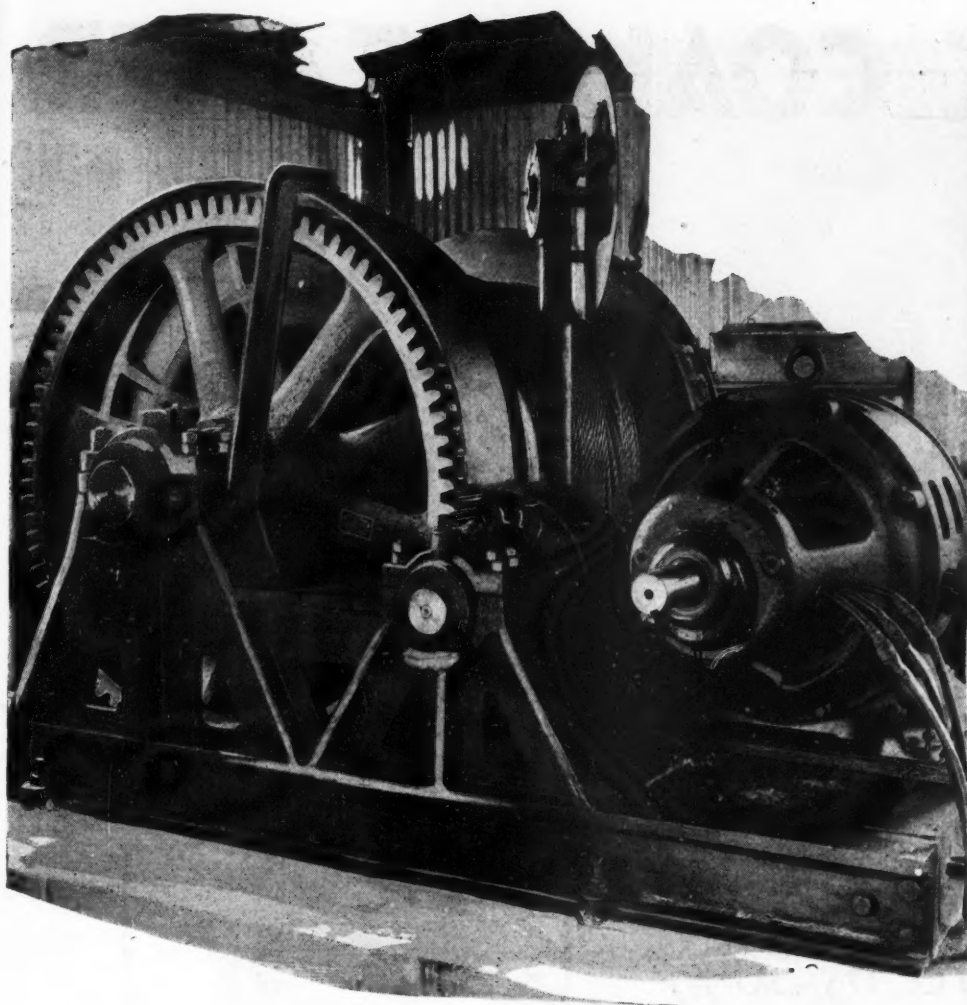
Ohio Brass Company, Mansfield, Ohio  
Dominion Insulator & Mfg. Co., Limited  
Niagara Falls, Canada  
274M

**Ohio Brass Co.**



PORCELAIN  
INSULATORS  
LINE MATERIALS  
RAIL BONDS  
CAR EQUIPMENT  
MINING  
MATERIALS  
VALVES





## Another case of once used always used!

After a mine once installs a Vulcan Hoist, it wants Vulcan Hoists for all future installations. This is the story of the Alden Coal Company.

The Alden Coal Company needed another hoist recently so they duplicated the Vulcan shown on this page. It is a 100 h.p. hoist, 680 r.p.m., and has a capacity for a rope pull of 9000 lbs.

This installation is one of three duplicates—the first of which was installed in 1920. Vulcan Hoists of other sizes were installed by this mining company prior to 1920.

It will pay you to find out about Vulcan Hoists. We can let you have the type hoist displayed in this photo, for example, in sizes ranging from 24 to 72 inch diameter drums and with rope pull capacities of 3,000 to 18,000 lbs. Get in touch with Vulcan Hoist Engineers.

### VULCAN IRON WORKS WILKES-BARRE, PA.

New York Office:  
50 Church St.

Established 1849

Chicago Office:  
McCormick Bldg.

# VULCAN of WILKES-BARRE HOISTS



Ask any of  
these users—  
they know!

Nanty-Glo Coal Mining Co.,  
Nanty-Glo, Penna.  
Bulah Shaft Coal Company,  
Ramey, Penna.  
Eclipse Gas Coal Company,  
1405 Oliver Bldg.,  
Pittsburgh, Penna.  
Rum Creek Collieries & By-  
Products Company,  
Dehue, West Virginia  
Monroe Coal Mining Co.,  
260 S. Broad St.,  
Philadelphia, Penna.  
Thomas Iron Company,  
Wharton, New Jersey  
West End Coal Company,  
1007 Mears Bldg.,  
Scranton, Penna.  
Bulls Head Coal Company,  
Scranton, Penna.  
Bessemer Coal & Coke Co.,  
Pittsburgh, Penna.  
Moosic Mountain Coal Company,  
Marshwood, Penna.  
National Mining Company,  
412 Frick Bldg.,  
Pittsburgh, Penna.  
Federal Lead Company,  
Federal, Illinois  
Canadian Mining & Finance  
Company,  
Hollinger Consolidated Gold  
Mines, Ltd.,  
Timmins, Ontario, Canada

### Vulcan Product

Hoists  
Cranes  
Conveyors  
Rollers  
Screens  
Grates  
Pumps  
Engines  
Boilers  
Furnaces  
Mills  
Gears  
Shafts  
Wheels  
Drums  
Cylinders  
Conduits  
Cast Iron Castings  
Open Hearth Steel Castings  
Cores, Moulds and Gas Taps  
Special Machinery

# CHANCE COAL CLEANER



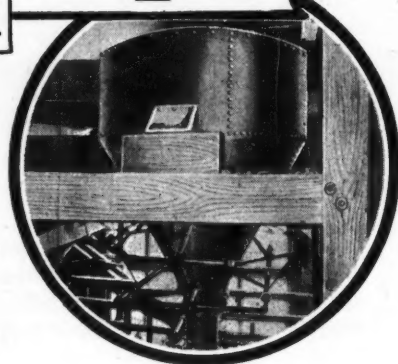
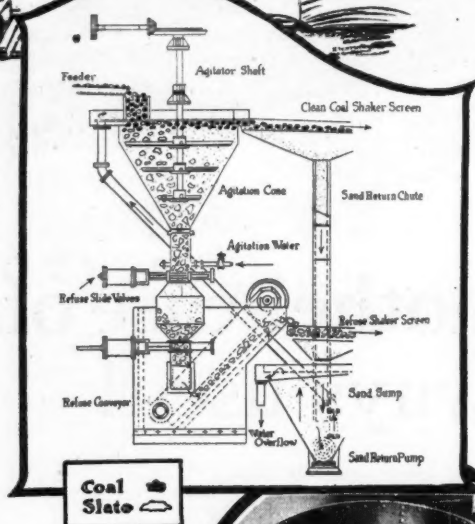
**"We have reduced  
our outside force by 50%"**

*Excerpt from a letter in our files  
written by an anthracite operator  
with reference to his Chance  
Cleaner.*

This operator has built a new Chance Cleaner breaker to replace his former plant, thus effecting among other advantages, an economy in operation that will greatly increase his profits.

Through the installation of the Chance Sand Flotation method, you can secure not only economies in operation but also other advantages that are equally important such as lower first cost, complete recovery of all marketable coal and the elimination of all retreatment costs, in addition to the well known uniformly high quality of product.

If you are interested in producing a quality product at lowered costs with consequently increased profits—a product that because of its high quality will bring a better price and retain its market against all competition, we would welcome the opportunity of showing you what is being done by some of the twenty-five Chance Cleaners now operating in the Anthracite field.



H. M. Chance & Co.  
Engineers

Drexel Building  
Philadelphia, Penna.

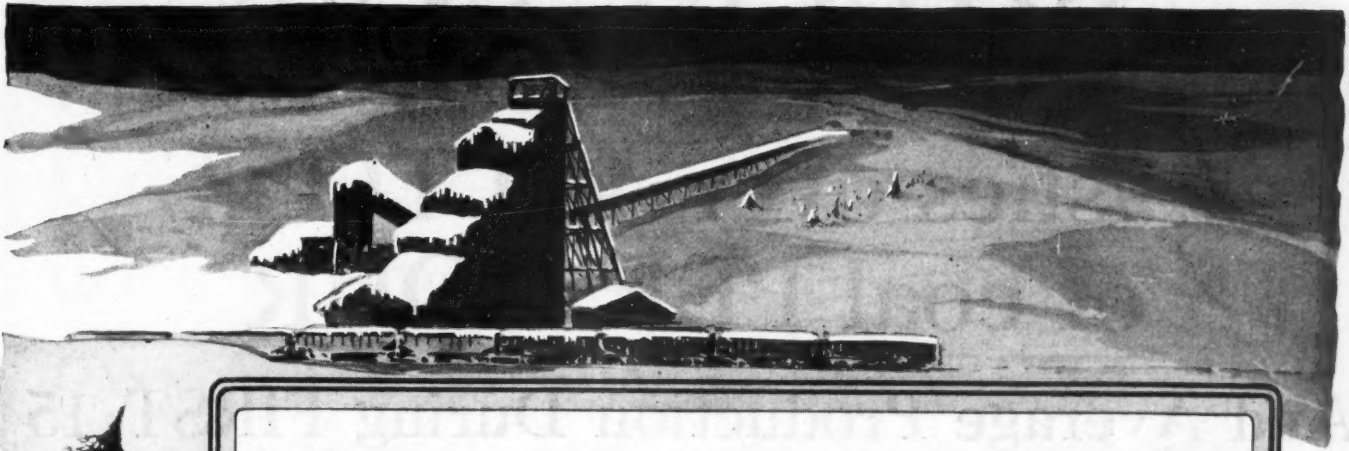
## CHANCE COAL CLEANER

M. A. WALKER, GENERAL MANAGER  
MEARS BUILDING, SCRANTON PENNA.

H. O. Staples  
Sole Anthracite Licensor

Mears Building  
Scranton, Penna.





**TO THE COAL OPERATORS AND THEIR ASSOCIATES**

**GREATLY APPRECIATING YOUR GOOD-WILL**

**AND WITH RENEWED DETERMINATION**

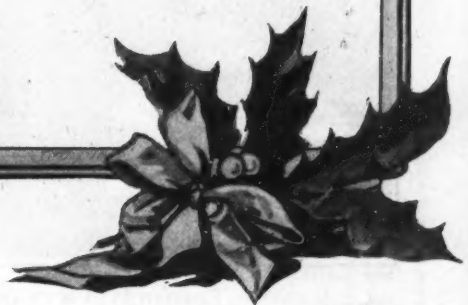
**TO MERIT ITS CONTINUANCE, WE WISH YOU**

**CHRISTMAS HAPPINESS AND HIGH ACHIEVEMENT**

**IN THE NEW YEAR**

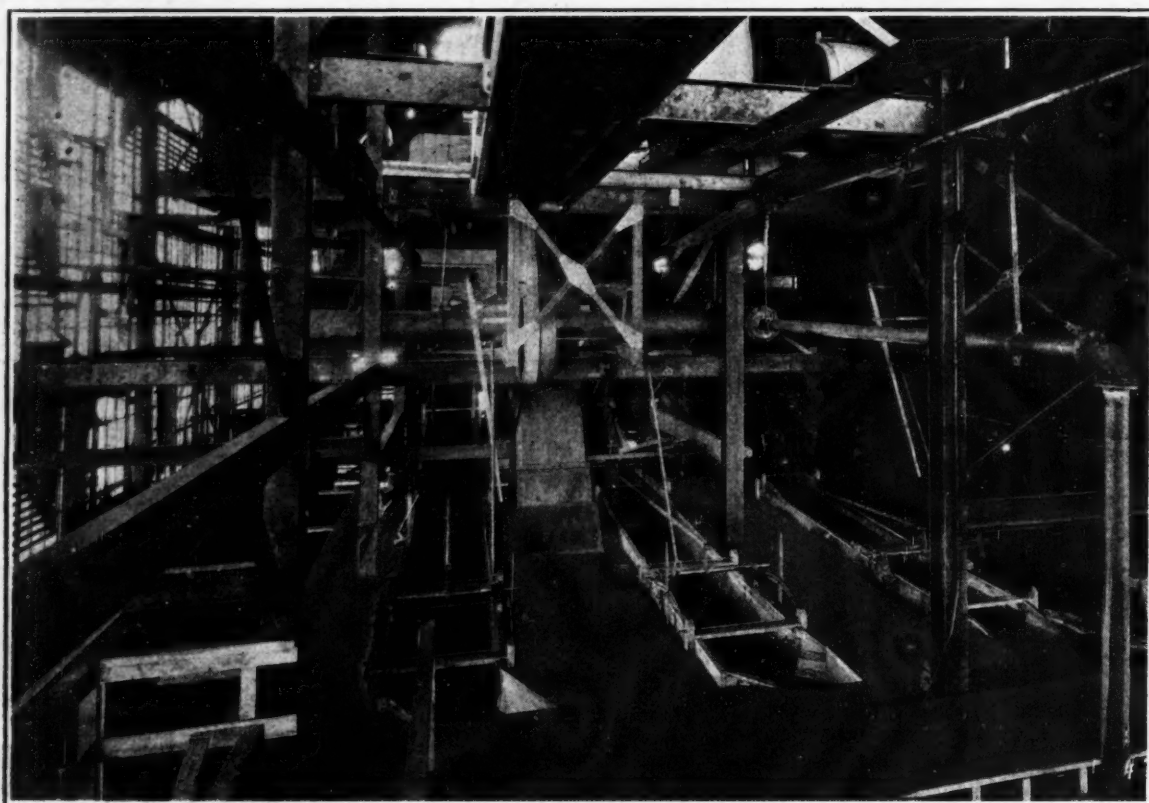
**HULBURT OIL AND GREASE COMPANY**

**PHILADELPHIA, PENNSYLVANIA**



# THIS PLANT washes over 400 TONS of coal PER HOUR

And Average Production During FIRST 15  
DAYS Was in EXCESS of Rated Capacity



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**American Rhéolaveur Corporation**

NEW YORK OFFICE  
120 Broadway

WILKES-BARRE OFFICE  
911 Coal Exchange Bldg.

**The  
Rhéo laveur**  
CURRENT WASHER

American Rhéolaveur Corp., Wilkes-Barre, Pa.  
911 Coal Exchange Bldg.  
Please send me bulletin on the Rhéolaveur Process.  
Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
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Insulation! That's where "U. S." Cables excel—and where cable breakdowns come first. Rubber from our own plantations—rubber properly compounded for coal mine needs—cables specially and specifically designed for every type of electrical mining service. These are some of the factors that make "U. S." Cables good cables for your mine.

There is a complete line of "U. S." Wires and Cables for every coal mine need. Let us send you samples.



And—

When you need a good quality friction tape or splicing compound—Specify "U. S." Holdtite Friction Tape and Usco Splicing Compound.

United States



Rubber Company

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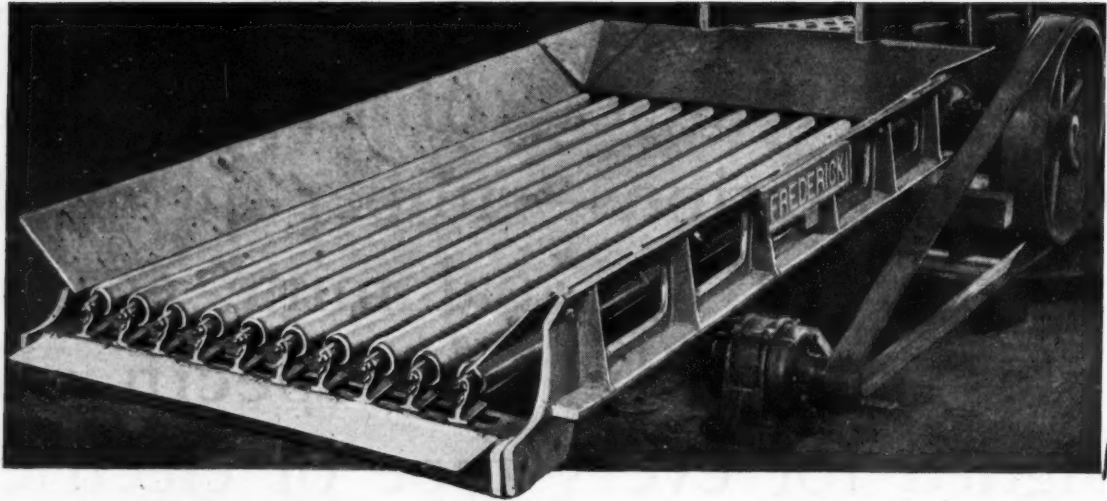
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New York City

Warehouse stocks in every mining center

# "U.S." CABLES

# Frederick Coal Separator



## *Dollars or Cents?*

That's just the difference between "perfect screening without breakage" and screening with breakage. Frederick Separators yield a greater percentage of prepared sizes and a smaller percentage of screenings per ton of coal mined because crushing, breaking and "nipping" are eliminated.

That means larger profits for preferred tonnage.

Here are a few of the companies successfully using Frederick Separators.

Jaffy Coal Mining Co., Shaw, W. Va.

Sullivan Bros. Coal Co., Frostburg, Ind.

Mt. Savage Georges Creek Coal Co., Mt.  
Savage, Ind.

Bon Ayr Coal Co., Terre Haute, Ind.

*Write them and then write us for engineering details.*

**The FREDERICK IRON & STEEL CO.**

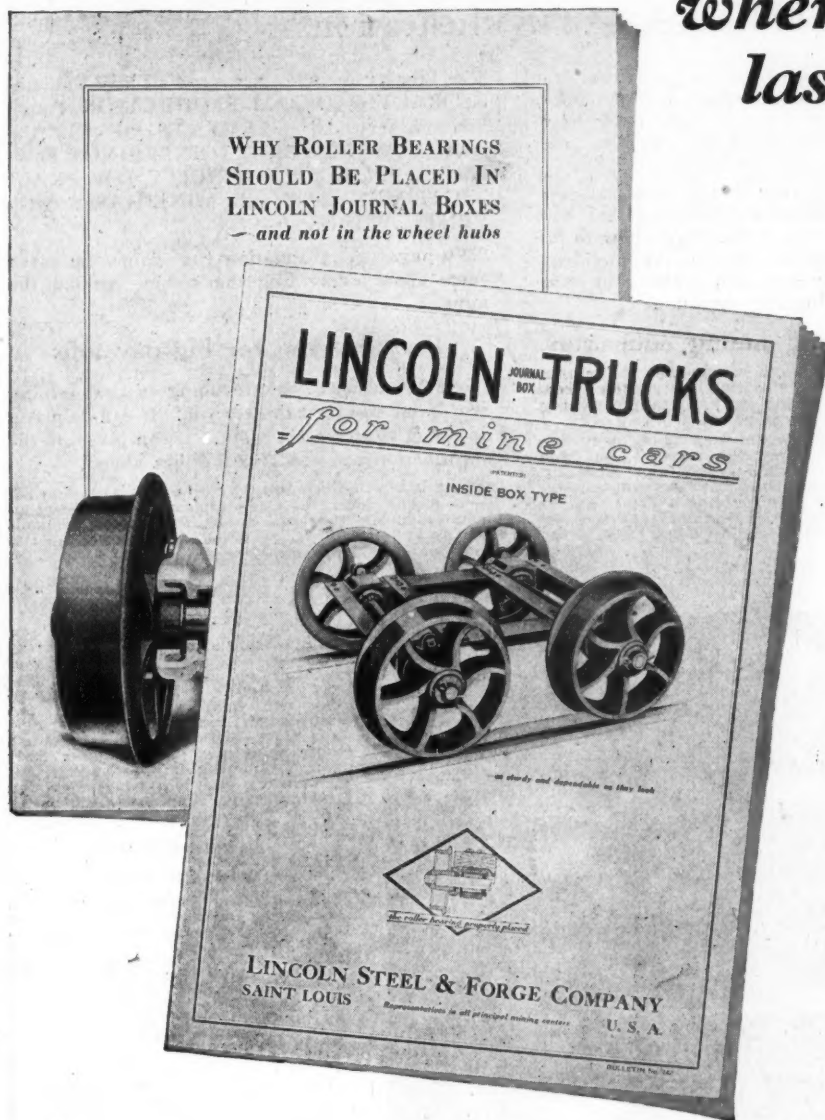
FREDERICK, MD.

*Sole Manufacturers and Distributors West of the Mississippi: The Pittsburg Boiler & Machine Co., Pittsburg, Kansas*



# Which are cheaper to replace—plain or roller bearing wheels?

*Why not put roller bearings where they will last indefinitely?*



Once convinced of the superiority of roller bearings over plain bearings, for mine cars, operators are willing to pay the increased cost in view of the benefits to be derived.

Why not go a step farther with this, and place the expensive roller bearings where they will not only function properly, but will function continuously, without being subject to thrust, uneven load, wear, destruction? Lincoln Roller Bearing Trucks, with the bearings in journal boxes, *not in the wheels*, have been in continuous use for over five years in some instances, without showing any evidence of strains or unequal wear. Thrust washers taken from these bearings still show the mill scale, evidence of the almost total absence of thrust.

You will want full details, of course. This space is too limited to give but a bare idea of the importance of this subject, but let us send you the two bulletins represented. No. 241 for instance, explains clearly and in detail, why roller bearings should be placed in journal boxes. Bulletin 242 describes Lincoln Journal Box Trucks, and the methods used to apply the principles outlined in Bulletin 241. Read these two booklets, and decide for yourself whether you can afford to continue destroying and replacing worn out roller bearings.

*Write at once for these Bulletins*

## LINCOLN STEEL & FORGE COMPANY

5701 Natural Bridge Ave.

St. Louis, Mo.

# Just Out!

The first announcement of

## The New

# Coal Mining Library

6 volumes—2393 pages—1448 illustrations

Practical  
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about  
every coal  
mining job

Tells you  
what to do  
and how  
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2393 pages of information you want—the plain facts about everything that's done around the mine.

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# And now the Super-motored Locomotive



A 15-Ton Goodman Locomotive, with Two 120-Hp. Motors

## 240—HORSEPOWER—240

Super-motoring extends the well-known advantages of Over-motoring, enabling the locomotive to render with still greater ease the hardest of heavy-duty service.

Standard Motoring.....	180 Horsepower
Over-motoring .....	210 Horsepower
Super-motoring .....	240 Horsepower

### *Super-motored Locomotives—*

Will operate continuously, over long hauls, at high speeds, on hilly roadways, with maximum loads—

Without overheating, without signs of overload distress, without increase of upkeep expense, and without the greater liability of breakdown delays which such strenuous duty might cause with standard motoring.

Super-motoring increases the net electrical efficiency and introduces a larger factor of safety for the whole electrical equipment. It is well worth while.

The Nelson locomotive pictured here has also the standard Goodman features of—

Cut-away Frame Plates for Accessibility to Brake Adjustment  
 Axle-end Side Thrust Bearings—Ample Road Clearance  
 Spring-mounted Bumpers—Large Sand Boxes  
 Transverse Equalizers—Long Wheelbase

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**Locomotives - Loaders - Coal Cutters**  
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# R Du Pont Prescription Paint Service

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E. I. du Pont de Nemours  
and Company, Inc.



## Repair and Replacement

..... or

THERE are two kinds of mine village maintenance—"corrective" and "preventive." The first kind of maintenance is costing mine owners millions of dollars while the second kind—painting to prevent decay and depreciation—costs only 2% of the capital invested.

But to "just paint" is not sufficient. One coal company spent \$10,000 for village painting, without giving the matter any real thought. A loss of \$8,000 followed when the paint began to chip, crack and disintegrate, a loss that was entirely unnecessary.

Du Pont Prescription Paint Service enables you to buy and apply paints with the same accurate foreknowledge that you apply to the purchase and use of machinery, equipment and other supplies. A du Pont paint engineer, without putting you under any obligation or costing you a penny, will make a thorough paint survey of your mine village and work out a comprehensive set of recommendations. Your preventive maintenance problem will be solved not just for this year, or the next five years, but indefinitely.

Isn't such a marked economy worth looking further into? Call your stenographer and dictate a note before your attention is distracted!

E. I. DU PONT DE NEMOURS & CO., Inc.

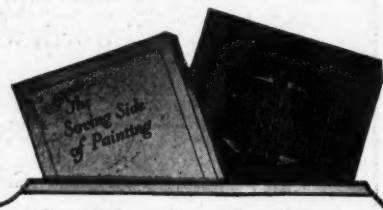
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**PAINTS, VARNISHES, ENAMELS, DUCO**



Send for these booklets

"The Saving Side of Painting"—packed full of interesting facts—free. "Principles and Practices of Upkeep Painting"—authoritative work—really a text-book—any executive will find it a practical aid and guide—price \$1.50 and worth much more.



# Positive alignment of the rolls

Remove the cage from a Timken Bearing, and revolution will not misalign the rolls. Jam the uncaged rolls between the bearing races and revolution will automatically re-align the rolls. Only Timken *POSITIVE ROLL ALIGNMENT* makes it possible.

This positive action is produced by guiding the rolls mechanically along the rib of the cone, through two precisely determined areas of contact with the base of each roll.

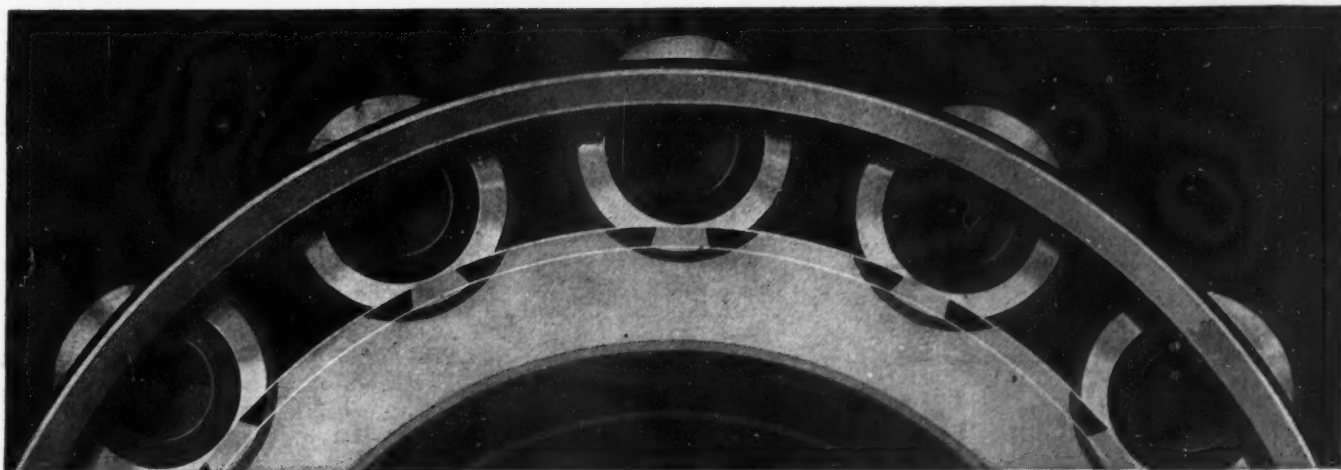
Thrust, speed, torque and radial load align

Timken rolls all the more positively! Each roll is therefore constantly doing full duty, free of excessive cage friction.

This added working capacity and reduced friction in the bearings must give Timken-equipped machinery greater simplicity, rigidity, precision, and output, while reducing the cost of power, lubrication and maintenance. These results have put Timkens into the most advanced designs of leading machinery manufacturers in every line.

**THE TIMKEN ROLLER BEARING CO., CANTON, OHIO**

Technical information regarding bearing sizes and their mountings can be secured from the Timken Roller Bearing Service & Sales Company's Branches located in the following cities: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, Newark, New York, Omaha, Philadelphia, Pittsburgh, Richmond, St. Louis, San Francisco, Seattle, Toronto, Winnipeg.

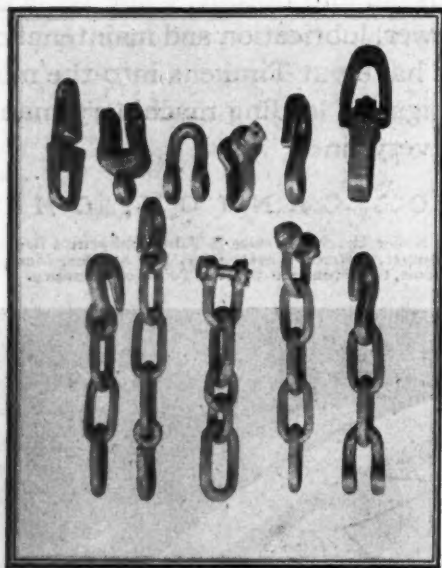


## **TIMKEN** *Tapered Roller* **BEARINGS**

"After this



we'll buy our  
couplings from  
"Car Foundry"



Once upon a time—16 years ago to be exact—a mining company had an accident. A coupling broke on one of the cars of a trip which was going up grade. A number of cars—all heavily loaded—coasted backwards down to the bottom of the grade. The smash-up at the bottom was serious, endangering the life of more than one man.

"After this," said the president of the mining company, "use only the best couplings that money will buy! It doesn't pay. We'll buy couplings from a company which knows how to make them—we'll buy them from 'Car Foundry'!"

For 16 years—ever since the accident—this mining company has been buying couplings as well as all other car parts from "Car Foundry."

"Car Foundry" couplings, drawbars, wheels, axles and all other parts are made by men who know the conditions mine cars run up against; and build every car part to withstand these conditions.

Let a "Car Foundry" Engineer tell you what goes on in the three big "Car Foundry" Plants to perfect the cars and car parts. Write for the facts.

American Car and Foundry Company

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FF **CAR FOUNDRY** FF

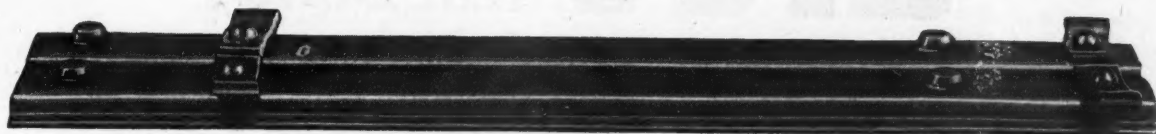
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CAR IRONS

BOLTS, NUTS, RIVETS  
IRON BODY GATE VALVES  
CAR TRUCKS

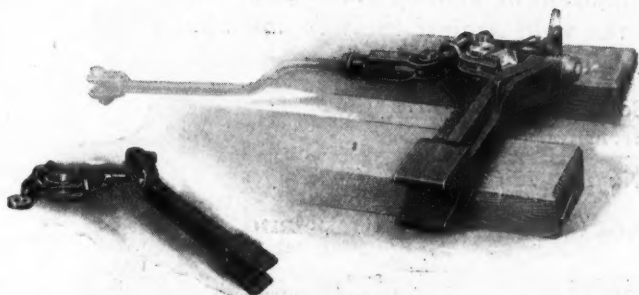
CHILLED IRON WHEELS  
PINS AND LINKS  
FLANGED PIPE



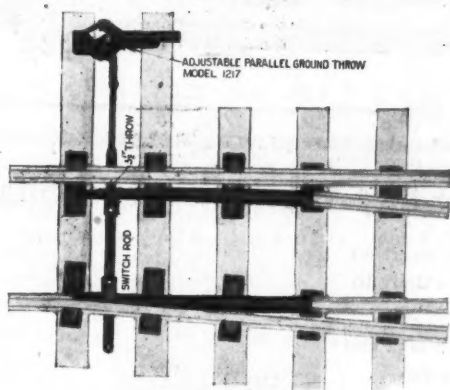
# Bethlehem Industrial and Mine Track Specialties



*The "Bethlehem" Mine Tie*



*Parallel Throw Switch Stand  
Model 1217*



*Heavy Duty Switch  
Design 395*

*include:*

- Steel Mine Ties
- Grim Rail Clamps
- Light Rails
- Splice Bars
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- Mine Car Sprags
- Coupling Pins and Links

*Catalog sent on request.*

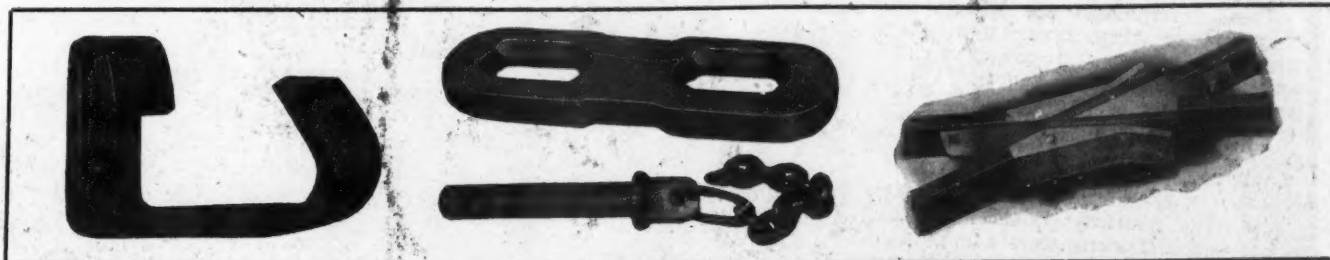
**BETHLEHEM STEEL COMPANY, General Offices: BETHLEHEM, PA.**

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*Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products*

# BETHLEHEM



# UNA Metmold Mine Bonds

*Reduce your haulage costs because  
UNA Bonded Joints eliminate power  
losses at the joint.*

The metal mold, forming an integral part of the bond head, so simplifies the bonding operation that the welding operator always obtains a good bond.

The mold offers the most fool-proof method of welding every bond strand into the weld against the web and base of the rail.

With the welded UNA Bond—Copper ONLY carries the current from rail to rail.

*Send for Bulletin No. 116*

UNA WELDING AND BONDING COMPANY, Cleveland, Ohio



## 7% Grades Are Every-day Work For This Shay

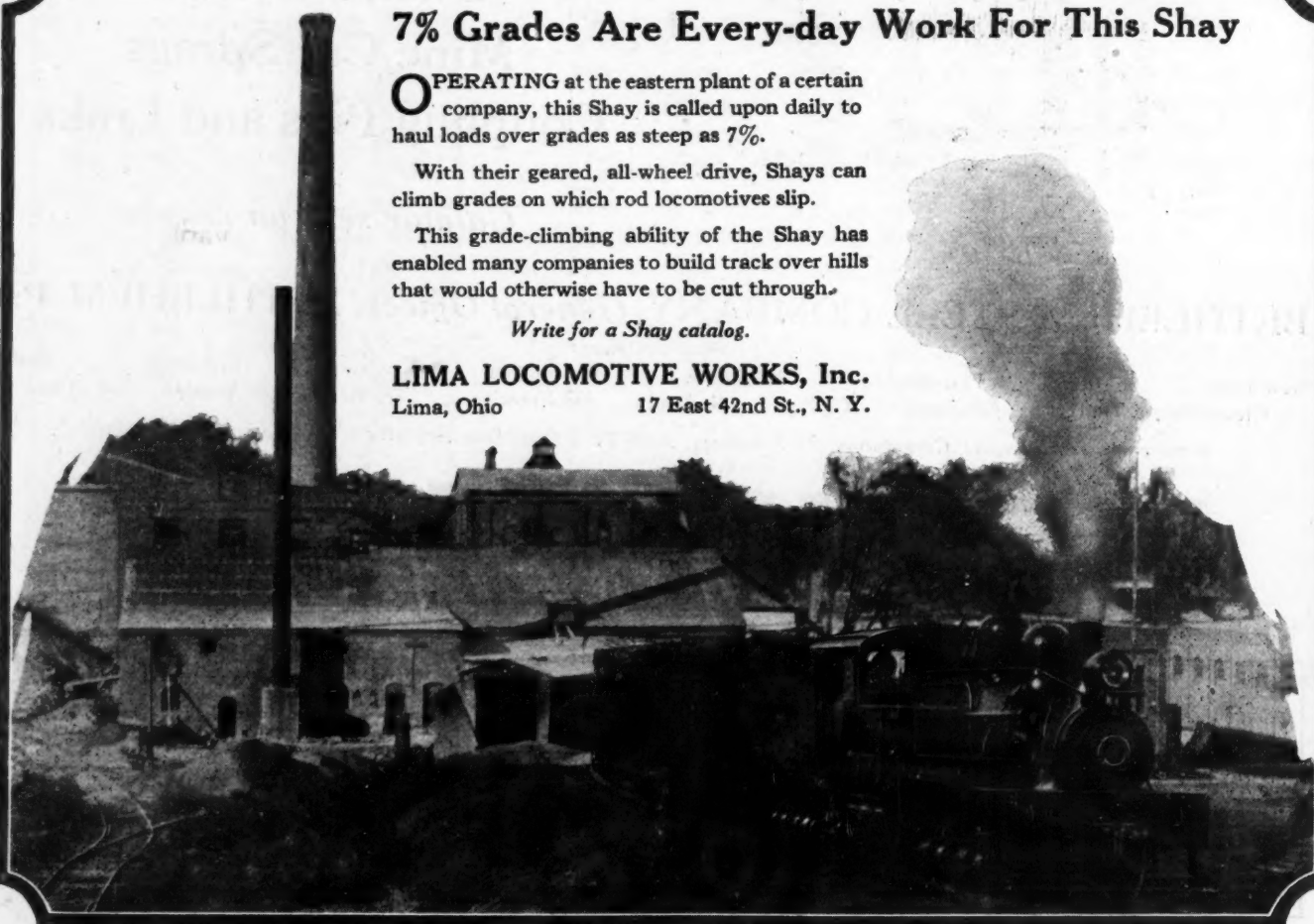
**O**PERATING at the eastern plant of a certain company, this Shay is called upon daily to haul loads over grades as steep as 7%.

With their geared, all-wheel drive, Shays can climb grades on which rod locomotives slip.

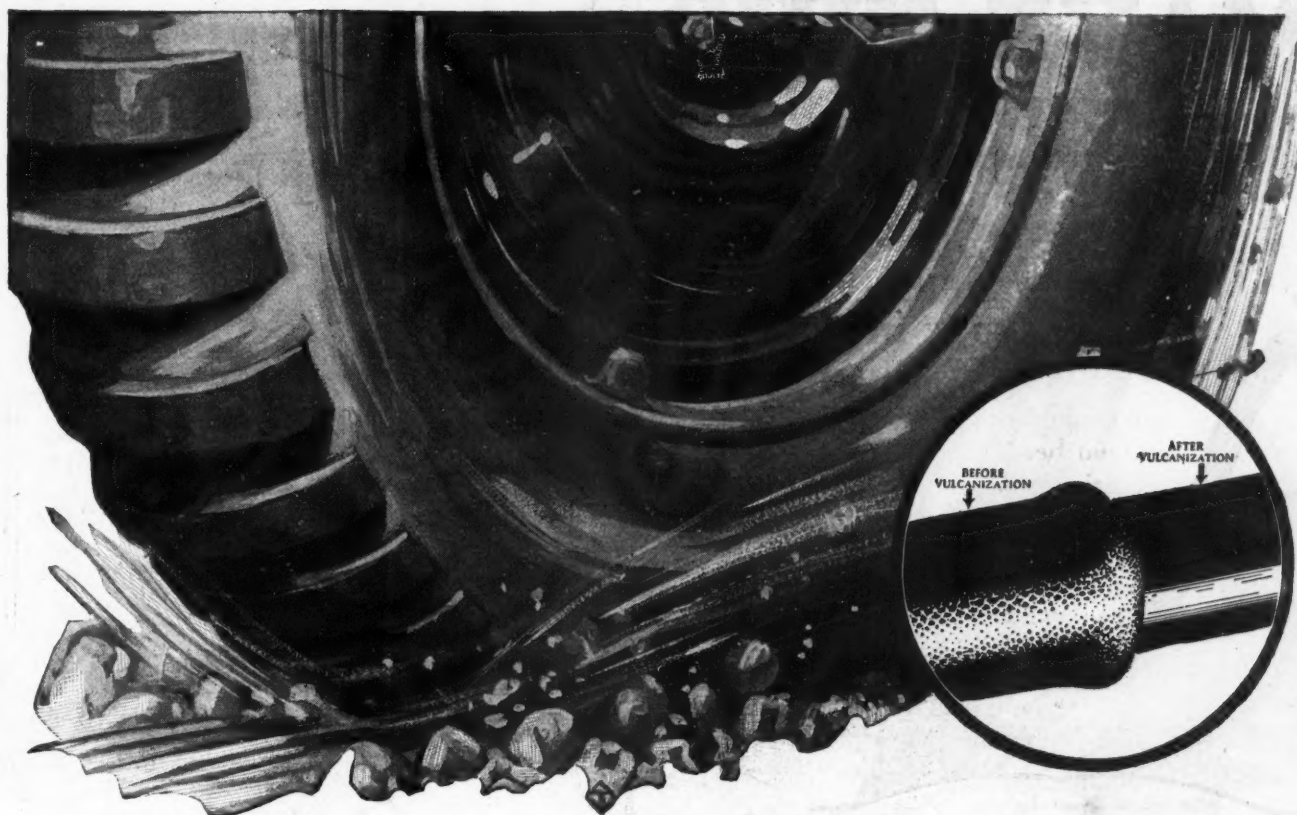
This grade-climbing ability of the Shay has enabled many companies to build track over hills that would otherwise have to be cut through.

*Write for a Shay catalog.*

**LIMA LOCOMOTIVE WORKS, Inc.**  
Lima, Ohio      17 East 42nd St., N. Y.







# Vulcanized—

*like the tire that carries you  
thousands of miles*

**T**OUGH TOOL! Built to stand the gaff of daily life in a coal mine. Every foot of Super Service is vulcanized in huge steel molds, under tons of pressure. The outer jacket of rubber is compressed into a tough, dense, protective covering, which absorbs the blows that might otherwise damage the copper conductors.

Drag it through pools of water, yank it out of switch frogs, and across sharp coal faces—in short, give it the same rough treatment that kills the ordinary cable in a few short months, and Super Service will come up smiling.

If you haven't a Super Service catalog write for one today.

ROME WIRE COMPANY, Mills and Executive Offices, Rome, N. Y.

Diamond Branch, Buffalo, N. Y.

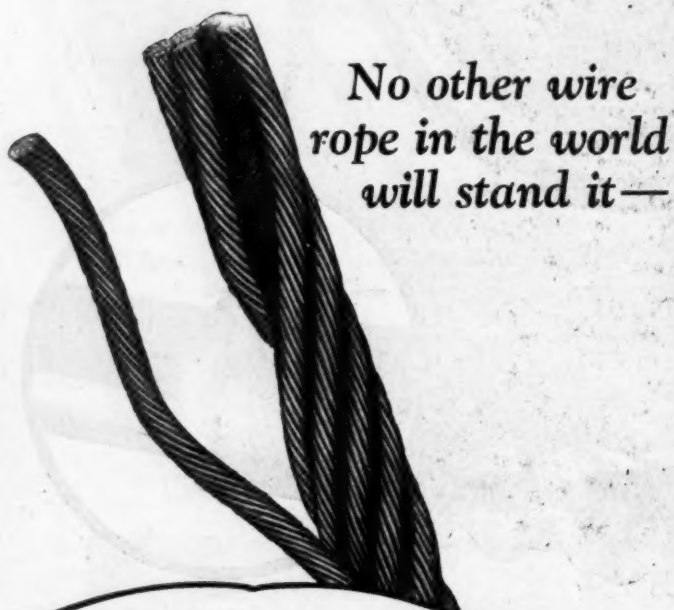
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# MAKE THIS TEST



No other wire rope in the world will stand it—

First write for a sample of Tru-Lay Brand Wire Rope—the first basic improvement in 100 years.

When you receive it, take it in your hands and examine it carefully. You will be surprised to note that the ends require no seizing. Then force from its place an individual strand and unwind it. The balance of the strands composing the rope will remain in their places—for each wire and strand is preformed to the shape it will take in the finished rope. The ability to resist unstranding is, however, but one of the many advantages Tru-Lay Brand offers its users.

Tru-Lay Brand will permanently solve your wire rope problems, give greatly added service and reduce your operating and maintenance costs. Know the facts—write today for sample length and interesting literature.



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The Dominion Wire Rope Company, Limited, Montreal, Sole Canadian Licensed Manufacturers

**PREFORMED WIRE ROPE**

TRADE **TRU-LAY** MARK

[REG. U. S. PAT. OFF.]



*The Cincinnati*

*Sent on Trial*

2 minutes to drill shot holes 6 to 8 feet deep!

You can drill shot holes 6 to 8 feet deep in from 2 to 3 minutes with "The Cincinnati" Portable Electric Coal Drills.

Sturdy and easy to handle, they will boost production immeasurably.

Send for Bulletin 113

**The Cincinnati Electric Tool Co.**

Madison and Edwards Roads  
Cincinnati, Ohio

## A Complete Line of Compressed Air Machinery for the Mine

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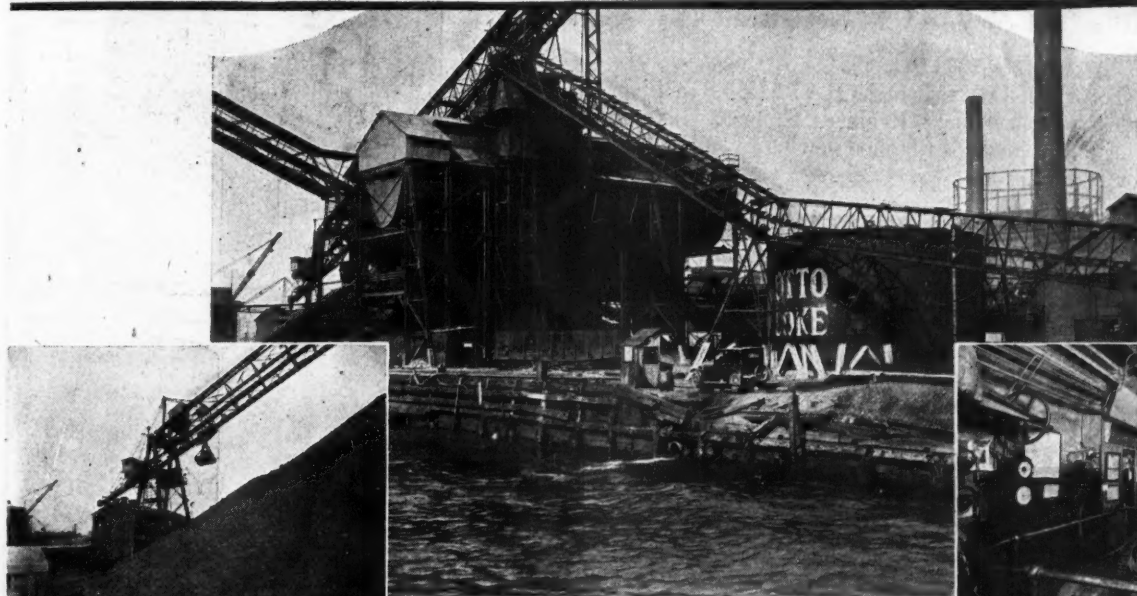
FOR CANADA REFER CANADIAN INGERSOLL-RAND CO LIMITED, 200 ST. JAMES STREET MONTREAL QUEBEC

**Ingersoll-Rand**

3-Misc.



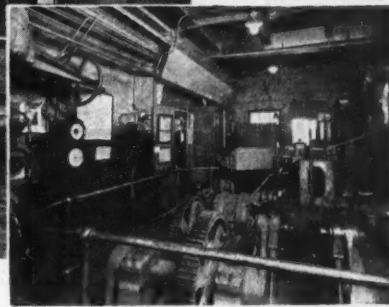
# The difference between profit and loss



The Camden Coke Co.'s Plant at Camden, New Jersey.



This three ton bucket is equipped with C-H Hoist Control. On this type of work C-H Control gives more lifts per day.



The coke ovens in this plant are reversed every thirty minutes. C-H Control governs automatically the reversing machinery shown in this photograph.

## —often lies in adequate motor control

Is your plant operating on a basis of the lowest possible cost per unit of production? Is there no way in which the margin between production cost and selling price can be expanded?

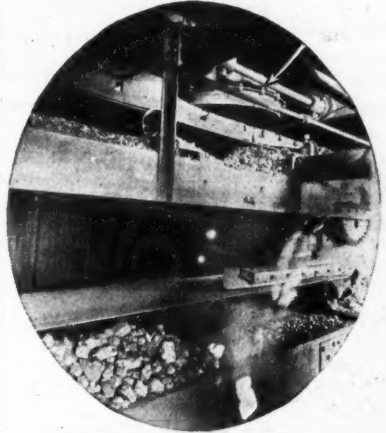
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*C-H Engineers will gladly consult with you as to the proper type of control for your motors.*

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C-H Hoist Control for the three ton bucket shown above. Motors are kept working at top speed yet are protected from mishap and mishandling that would cause interrupted service.



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*Industrial Efficiency Depends on Electrical Control*

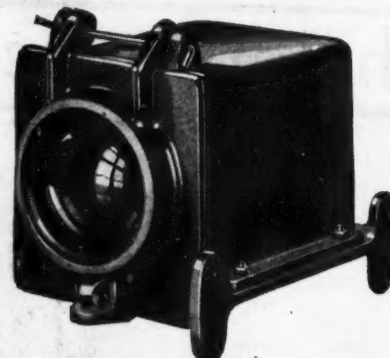
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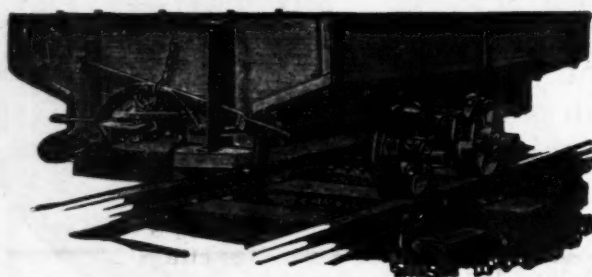
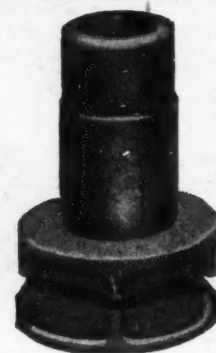


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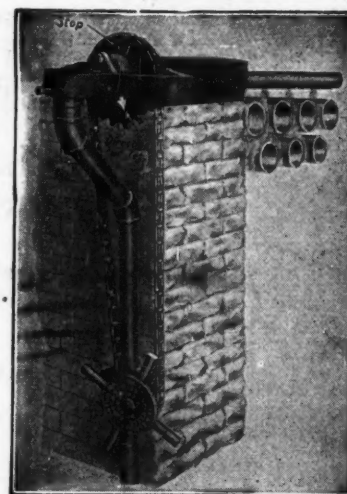
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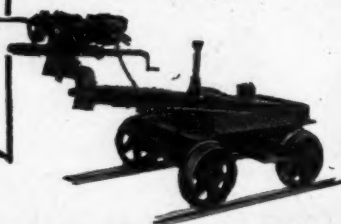
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Fig. 227  
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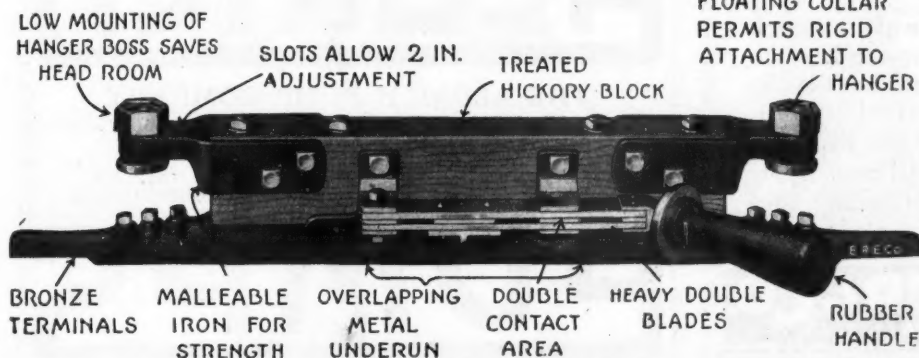
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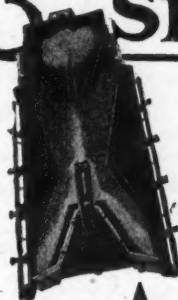
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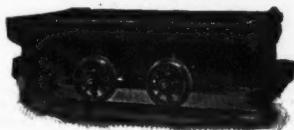
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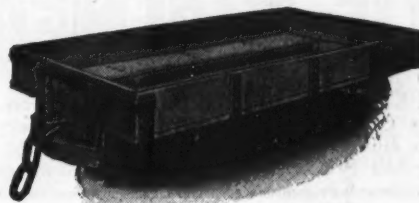
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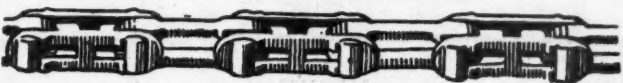


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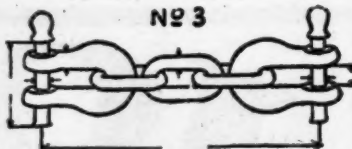
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7—450 hp. at 40 deg. Westinghouse Type CW, 2 bearing, Slip Ring Motors, 3 phase, 60 cycle, 2200 volt, 435 r.p.m., frame No. 1218. Complete with Westinghouse full automatic primary and secondary magnetic control. Excellent condition.

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- 2—1302-ft. Ing-Band 20 and 12½x14 PRE-2 with motors.
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- 1—2880-ft. Ing-Band 28 and 16½x24 PRE-2 with motor.
- 1—3864-ft. Ing-Band 33 and 20½x24 PRE-2 with motor.

(New Traylor portable gasoline compressors.)

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Qu.	Type	Make	Size
1	Duplex	Advance	4 1/2 x 2 1/2 x 4
1	Simplex	American	6 1/2 x 1 1/2
1	Simplex	Dean Bros.	3 1/2 x 3 1/2 x 4
1	Simplex	Dean Bros.	4 1/2 x 1 1/2
1	Simplex	.....	4 1/2 x 2 1/2 x 7
1	Simplex	Dean Bros.	5 1/2 x 2 1/2
2	Simplex	Dean Bros.	5 1/2 x 2 1/2
1	Duplex	Dean Bros.	7 1/2 x 1 1/2
1	Simplex	Dean Bros.	10 x 7 x 12
1	Simplex	Dean Bros.	10 x 8 x 12
1	Simplex	Dean Bros.	10 1/2 x 7 x 12
2	Duplex	Dean Holyoke	3 x 2 x 3
1	Simplex	Dean Holyoke	8 x 8 x 10
1	Duplex	McGowan	4 1/2 x 2 1/2 x 4 1/2
1	Duplex	McGowan	4 1/2 x 2 1/2 x 4 1/2
1	Duplex	McGowan	12 x 10 x 12
1	Simplex	Reilly	4 x 2 1/2 x 7
1	Simplex	Reilly	5 x 2 1/2 x 7
1	Simplex	Reilly	6 x 4 x 7
1	Simplex	Reilly	7 x 4 x 10
1	Simplex	Reilly	7 x 4 x 10
1	Simplex	Reilly	8 x 5 x 10
1	Duplex	Seranton	4 1/2 x 2 1/2 x 4
1	Duplex	Smith-Valle	20 x 10 x 8
1	Simplex	Union Burnham	4 x 2 1/2 x 5
2	Simplex	Union Burnham	5 x 2 x 10
1	Simplex	Union Burnham	5 x 7 x 10
1	Simplex	Union Burnham	5 1/2 x 7 x 10
1	Duplex	Worthington	5 1/2 x 4 1/2 x 5
31	Duplex	Worthington	6 x 2 1/2 x 6
9	Comp. Duplex	Worthington	12 x 18 x 12 x 12
1	Simplex	Blake	6 x 8 x 8
1	Simplex	Blake	10 x 10 x 12
1	Simplex	Blake	10 x 12 x 10
1	Simplex	Cameron	8 x 8 x 8
1	Simplex	Knowles	10 x 10 x 12

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Portable Track  
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- 12 AA Goodman 44-in. gauge, 250 volt D.C., 7 1/2 ft. Cutter Bars;
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- 27-A Jeffrey, 250 volt D.C., 36 or 42-in. Gauge;
- 35-A Jeffrey, 250 volt D.C., 38 1/2-in. Gauge, 6 1/2 ft. Cutter Bar;
- 3-ton 36 or 42-in. Gauge, 250 volt D.C., 1800 K Goodman Gathering Locomotives;
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- 5-ton, 37-in. Gauge, Ironton Battery Locomotives;
- 7-ton, 36-in. Gauge Ironton Battery Locomotive Batteries and 250 volt charging Rheostat;
- 100 kw., 250/275 volt D.C., 2200 volt, 3 phase, 60 cycle A.C. Ridgway Synchronous Motor Generator Set;
- 150 kw., 250/275 volt D.C., 2200 volt, 3 phase, 60 cycle A.C. Ridgway Synchronous Motor Generator Set;
- 200-kw., 275 volt D.C., 1200 r.p.m., 2200 volt A.C., Westinghouse Rotary Converter;
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Eliminates all permanent wiring, a constant danger.

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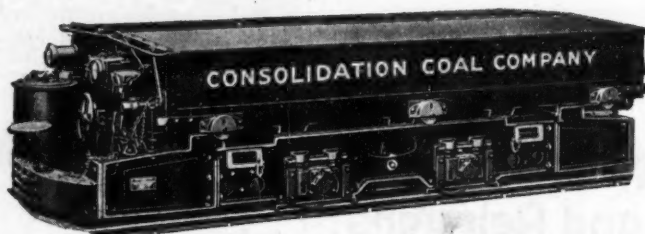
Mancha Permissible equipment makes this safety feature and cost-lowering feature practical. With Mancha Permissible Power Truck loaders, undercutters, shearing machines, pumps, drills, etc., can be driven by battery power, the capacity of this equipment being, in many

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STEAM-ELECTRIC-GASOLINE  
A FLORY HOIST FOR EVERY PURPOSE  
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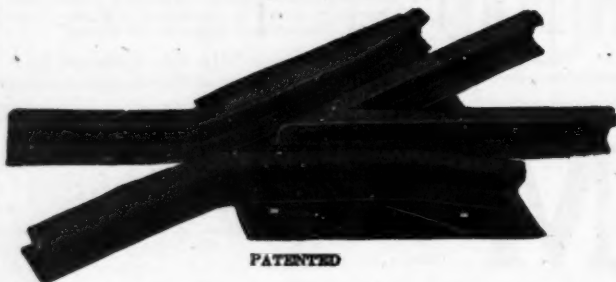
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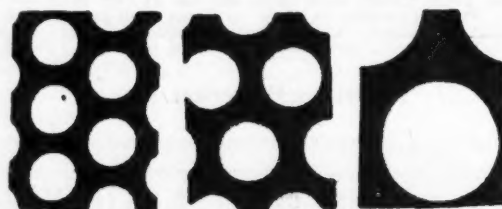
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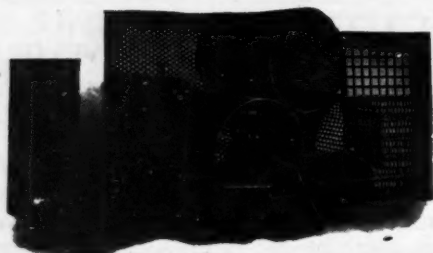
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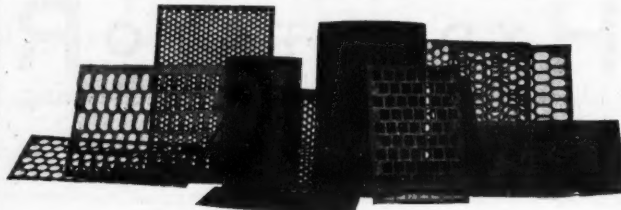
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For Alphabetical Index See Last Page

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**Box Car Loaders**  
Fairmont Mining Mch. Co.  
Link-Belt Co.

**Brakes, Electrically Operated**  
Cutler-Hammer Mfg. Co.

**Breakers, Circuit Electric**  
(See Circuit Breakers, Electric)

**Breaker Machinery**  
Vulcan Iron Works  
Wilnot Engineering Co.

**Buckets, Clamshell**  
Link-Belt Co.

**Buckets, Coal Handling**  
Link-Belt Co.

**Buckets, Elevator**  
Hendrick Mfg. Co.  
Link-Belt Co.  
Webster Mfg. Co.

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U. S. Rubber Co.

**Cableways**  
Flory Mfg. Co., S.

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Morrow Mfg. Co.  
Vulcan Iron Works

**Cagers, Automatic**  
Mining Safety Device Co.

**Car Feeders, Automatic**  
Mining Safety Device Co.

**Car Hauls**  
Jeffrey Mfg. Co.  
Link-Belt Co.  
Webster Mfg. Co.

**Car Irons**  
American Car and Foundry Co.

**Car Loaders (See Box Car Loaders)**

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Hulbert Oil & Grease Co.

**Car Retarders**  
Fairmont Mining Mch. Co.  
Webster Mfg. Co.

**Car Stops, Automatic**  
Mining Safety Device Co.

**Cars and Car Wheels**  
American Car and Foundry Co.  
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Lorain Steel Co.  
Ottumwa Iron Works  
Sanford-Day Iron Works  
Southern Wheel Co.  
Watt Car & Wheel Co.

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Chicago Pneumatic Tool Co.  
Ingersoll-Rand Co.

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Nuttall Co., R. D.  
Sanford-Day Iron Works  
Vulcan Iron Works

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Jeffrey Mfg. Co.  
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Morse Chain Co.  
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Du Pont De Nemours Co., Inc., E. I.

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Fairmont Mining Mch. Co.  
Sanford-Day Iron Works

**Clamps, Trolley Wire**  
Allen & Garcia Co.

**Controllers**  
Ohio Brass Co.  
Electric Railway Equip. Co.

**Circuit Breakers, Electric**  
Post-Glover Electric Co.

**Classifiers**  
Hydrotator Co.

**Coal & Ash Handling Mchry.**  
Frederick Iron & Steel Co.  
Jeffrey Mfg. Co.  
Link-Belt Co.  
Webster Mfg. Co.

**Coal Cleaning Machinery**  
American Coal Cleaning Corp.

**Coal Cutters**  
Goodman Mfg. Co.

**Coal Drills, Electric & Pneu.**  
Chicago Pneumatic Tool Co.  
Howells Mining Drill Co.

**Coal Handling Machinery**  
Fairmont Mining Mch. Co.  
Frederick Iron & Steel Co.

**Coal Mining Plants**  
Link-Belt Co.  
Webster Mfg. Co.

**Coal Preparation Machinery**  
American Coal Cleaning Corp.  
Hydrotator Co.

**Coal Storage and Rehandling Machinery**  
Fairmont Mining Mch. Co.  
Link-Belt Co.

**Commutators**  
Chattanooga Armature Wks.

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Goulds Pumps, Inc.  
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Deister Machine Co.

**Condensers**  
Ingersoll-Rand Co.

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Allen & Garcia Co.

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Link-Belt Co.  
Webster Mfg. Co.

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Link-Belt Co.  
Marion Mch. F. & S. Co.  
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Conveyor Sales Co., Inc.

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American Car and Foundry Co.

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Link-Belt Co.

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**Crushers, Coal**  
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Ironton Engine Co.  
Jeffrey Mfg. Co.  
Link-Belt Co.  
Marion Mch. F. & S. Co.  
Raymond Bros. Impact Pulverizer Co.  
Vulcan Iron Works  
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**Crushers, Rock**  
Raymond Bros. Impact Pulverizer Co.

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Hulbert Oil & Grease Co.

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Sherwood, E. C.  
Tippins & Sprengle  
Zelnicke Supply Co.

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Hoffman Bros.  
Sullivan Machinery Co.

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**Dredges**  
Marion Steam Shovel Co.

**Driers, Sand**  
Electric Service Supplies Co.

**Drills, Air**  
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Ingersoll-Rand Co.  
Sullivan Machinery Co.

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Chicago Pneumatic Tool Co.  
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Diamond Machine Co.

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Jeffrey Mfg. Co.  
Sullivan Machinery Co.

**Drills Electric (Portable)**  
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Cincinnati Electrical Tool Co., The

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Chicago Pneumatic Tool Co.

**Drills, Rock**  
Chicago Pneumatic Tool Co.  
Ingersoll-Rand Co.

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Morse Chain Co.

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Mining Safety Device Co.

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Sanford-Day Iron Works

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Dorr Co.

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Vulcan Iron Works

**Engines, Hoist & Haulage**  
Vulcan Iron Works

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Chicago Pneumatic Tool Co.  
Ingersoll-Rand Co.

**Engines, Steam**  
Chicago Pneumatic Tool Co.

**Engines, Steam, Four Valve**  
Ridgway Dynamo & Eng. Co.

**Engines, Steam Single Valve**  
Ridgway Dynamo & Eng. Co.

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Nordberg Mfg. Co.  
Ridgway Dynamo & Eng. Co.

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Marion Steam Shovel Co.

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Du Pont De Nemours Co., Inc., E. I.

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Jeffrey Mfg. Co.  
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**Gears, Worm Speed Reducing**  
De Laval Steam Turbine Co.

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Combustion Eng'g Corp.

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Vulcan Iron Works
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Vulcan Iron Works
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- Locomotives, Steam**  
Lima Locomotive Wks. Inc.  
Vulcan Iron Works
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Ironton Engine Co.  
Jeffrey Mfg. Co.  
Mandha Storage Battery Locomotive Co.  
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Waverly Oil Works Co.
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The Galigher Co.
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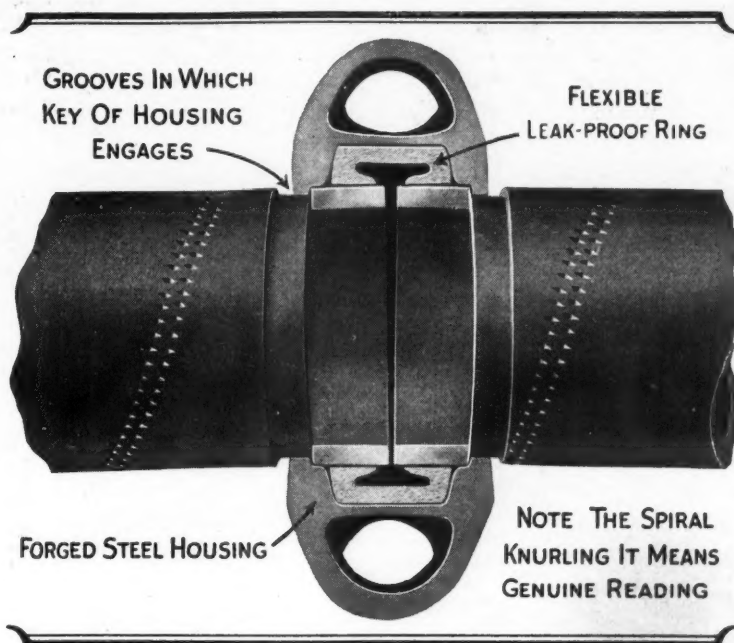
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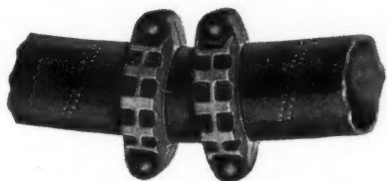
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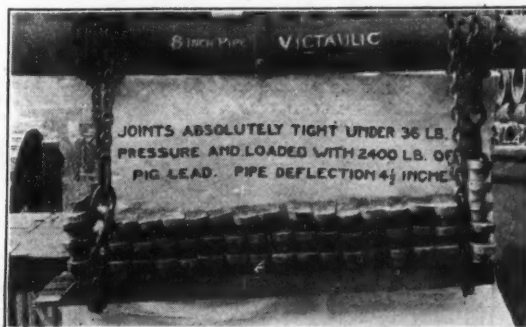
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